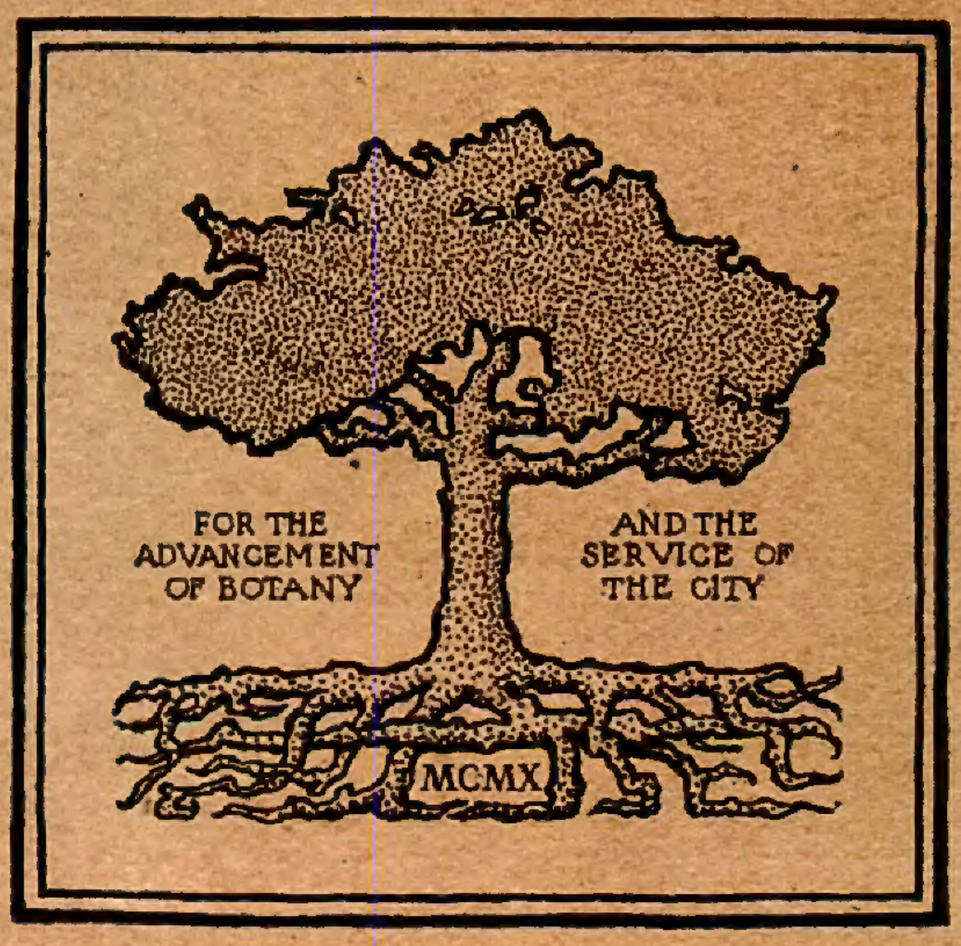
BROOKLYN BOTANIC GARDEN

RECORD

VOL. II JANUARY, 1913 No. 1

EDITED BY

C. STUART GAGER



CONTENTS

PAGE

Tree Planting by Prof. de Vries 1
Letchworth Park and Arboretum 7
Meeting of the American Association for the Planting and Preservation of City Trees 9
Organization of Children for the Planting of Trees 10
Conference with High School Teachers 11
Report of a Trip to Botanical Institutions 12
Report of a Trip to Rochester and to the Arnold Arboretum 15
School Gardens in Ceylon 18
Lincoln Place Tree Association 21
Notes 21

PUBLISHED QUARTERLY
BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
AT 65 DUANE STREET
NEW YORK, N. Y.

Botanic Garden Staff

DR. C. STUART GAGER, *Director*

MR. NORMAN TAYLOR, *Curator of Plants*

DR. EDGAR W. OLIVE, *Curator of Public Instruction*

DR. WILLIAM MANSFIELD,
Honorary Curator of Economic Plants

MISS BERTHA M. EVES, *Secretary and Librarian*

MR. HAROLD A. CAPARN, *Consulting Landscape Architect*

MR. JOHN V. BORIN, *Head Gardener*

MR. HERMANN KOLSH, *Foreman*

McKIM, MEAD & WHITE, *Architects*

OLMSTED BROS., *Landscape Architects*

Fig. 1. Prof. Hugo de Vries.

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN RECORD

VOL. II Brooklyn, N. Y., January, 1913 No. 1

TREE PLANTING BY PROFESSOR DE VRIES

As recorded in the preceding issue of the RECORD, the Garden was honored on the afternoon of September 12, by having a tree planted by Prof. Hugo de Vries, Professor of Botany in the University and Director of the Hortus Botanicus of Amsterdam. Preceding the lecture Professor de Vries made a tour of inspection of the Garden and was specially interested in the progress of our buildings, as a new laboratory and greenhouses are being constructed in his own garden at Amsterdam.

The weather was ideal, pleasantly warm, with no clouds and little wind. The invited guests, numbering about 100, assembled at the flag-staff at the northern border of the Garden, and proceeded thence to the grass path that winds through the shrubbery on the northeast slope of the local flora valley. The tree was in readiness, at the edge of the hole dug to receive it, and on each side of the path was a silk flag, one of Holland, the other of the United States. The silver trowel used was made especially for the Garden, and is intended for use on subsequent similar occasions. The exercises were as follows:

Presentation of the Tree by the Curator of Plants

Mr. Director: As Curator of Plants, I have the honor to announce that the tree chosen to be planted on this occasion is a specimen of the sweet-gum, known botanically as *Liquidambar Styraciflua.*

This tree was chosen for several reasons. Being planted within the limits of the Local Flora Section, or Native Wild Flower Garden, it must be a species growing without cultivation within 100 miles of Brooklyn. The sweet-gum occurs from Connecticut and Southern New York to Florida and Guatemala and westward as far as Illinois and Missouri. Being the only native species of the genus within our range, it may appropriately stand in this location, apart from other trees. Full grown specimens attain a height of 125 feet or more. It blossoms in April or May, casts abundant shade, favorable to the species of shrubs planted nearby, and owing to the brilliant fall color of its leaves,

FIG. 2. Professor de Vries Planting the Sweet-Gum Tree, September 12, 1912.

it is an object of especial beauty in the autumn. It belongs to the witch-hazel family, of the order Rosales.

Acceptance of the Tree by the Director of the Garden

Mr. Curator of Plants: I have examined the tree which you present for this planting, and find it to be a well formed, vigorous tree.

Introduction of Professor de Vries by the Director of the Garden

Members of the Brooklyn Institute of Arts and Sciences, Friends of the Garden, Ladies and Gentlemen: It is a cause of extreme gratification that the Garden is to enjoy the honor of having its first commemorative tree planted by so distinguished a botanist as Professor Hugo de Vries. Every student of plants, in every country of the civilized world, knows him by name, and appreciates the value of his work. To everyone he is known as the author of the fertile theory of mutation. By twenty odd years of continuous observation and experiment he was able to elaborate a theory which threw a flood of light upon the dark places of organic evolution, and became a powerful stimulus to research in all departments of experimental biology and evolutionary philosophy.

His early work on osmosis and other phases of plant physiology was fundamental and scholarly, and would, of itself, have insured him a reputation of the first rank as an experimental inquirer into the secrets of living matter.

We esteem it a high honor, Professor de Vries, that you have consented to plant this tree.

(To the gardeners)

Let the gardeners place the tree.

(To Professor de Vries)

The tree is set, and I hand you, Sir, to carry the soil, a trowel which has never before been used.

*Address of Professor de Vries**

Ladies and Gentlemen: I have more than once had opportunities of planting trees, but they were not *Liquidambar Styraciflua,* but species of the beeches and maples. I have hoped after I have planted them to live long enough to see them grow

*Recorded stenographically.

into mature trees, and then I hoped to get fruit and seed from them, which I could plant again and then watch the trees of the second generation to see how they behaved. But life is short, and I have not yet gotten the seed which I wanted to sow.

I have, however, never had an opportunity of planting a tree in so light and bright a country as this and in such a company of

FIG. 3. Sweet-Gum Tree (*Liquidambar Styraciflua*) Planted by Prof. de Vries. Photographed October 17, 1912.

distinguished persons and of teachers of natural science, and I am very glad to have had this opportunity, through the kindness

FIG. 4. Tree Planting Group, September 12, 1912.

MR. N. TAYLOR MISS A. B. GALLUP DR. C. B. DAVENPORT DR. W. MANSFIELD COL. R. B. WOODWARD
PROF. J. MICKLEBOROUGH DR. E. W. OLIVE PROF. DE VRIES DR. F. A. LUCAS
DR. G. H. SHULL DR. C. S. GAGER PROF. F. W. HOOPER HON. W. J. COOMBS

of the Director of the Garden, and I am glad to come here among you to do this.

Personally, I may say that I am indebted to Professor Gager for many kindnesses, and among many others, * * * for what he has done to help secure favorable acceptance here of my theories. I hardly have to remind you of the fact that he had the kindness to translate one of my little books into your language.

Coming to the words of Mr. Taylor, you have heard that this young tree is unique in its scientific relation to other trees of that part of the earth which is to be represented in this part of your Garden. Now, a young tree in a young garden suggests harmony. It shows how the Garden will increase, and gives us hope of seeing the Brooklyn Botanic Garden grow at the same rate as the tree, and grow to be one of the greatest of the earth. And the fact that it is unique in its scientific position, that no other tree of the same group (no other species of the same genus, *Liquidambar*) is found anywhere around here, suggests more harmony. It stands a young and healthy tree in a young and delightful Garden, a unique tree in a unique garden, and will be unique when it grows old and grand, as unique as it is here. I thank you.

Conferring of Honorary Membership in the Broooklyn Institute

At the close of the tree planting exercises, Professor Hooper, Director of the Brooklyn Institute, referring to the historical ties that bind the locality of the Garden and its vicinity to Holland, announced that Professor de Vries had been unanimously elected by the Council to honorary membership in the Institute, and that, as soon as the Board of Trustees convened for their first fall meeting, the certificate of membership would be made out and forwarded.* Professor de Vries replied in a few well chosen words, accepting the honorary membership, and expressing his appreciation of the same. This concluded the exercises of the afternoon.

At six o'clock the members of the Garden staff and a few invited guests took dinner with Professor de Vries at the home of the Director of the Garden.

---

*The action of the Trustees was taken on 11 Oct., 1912.

In the evening an audience of over two hundred had the pleasure of listening to a lecture by Professor de Vries in the lecture hall of the Academy of Music, under the joint auspices of the Garden and the Department of Botany of the Institute. The lecturer was introduced by Professor Henry E. Chapin, President of the Department of Botany.

LETCHWORTH PARK AND ARBORETUM

Those who have been interested for the past few years in matters pertaining to botanic gardens, forestry, and conservation, will recall Mr. William Pryor Letchworth's remarkable gift to New York State, in 1907, of a strip of land extending for three miles along both banks of the Genesee River, in New York State, and comprising about 1,000 acres. This region is not only of intense interest in connection with early Indian history, but is one of surpassing natural beauty, including, as it does, the three falls of the Genesee, known as the Portage Falls, and the beautiful gorge below. On the west bank of the river, opposite the middle fall, is the home where Mr. Letchworth lived for nearly fifty years.

It was Mr. Letchworth's original intention to build on his property an institution for afflicted and needy children, and at one period children were frequently invited to enjoy the hospitality of the home in large numbers. With the development of inventions for the electrical transmission of energy, water-fall sites throughout the country were eagerly sought, and in many cases secured, by so-called power companies, for the location of power plants. The Portage Falls were seriously menaced in this way about 1907, and it soon became evident that, so long as the land remained in private ownership, the preservation of the falls and of the adjacent valley would become increasingly difficult, if not, indeed, quite impossible.

After careful consideration and consultation with the officers of the American Scenic and Historic Preservation Society, Mr. Letchworth decided to deed his entire property to New York State, to be maintained in perpetuity as a public park, on the condition, among other terms, that the falls and other natural

scenery be preserved intact, and that the American Scenic and Historic Preservation Society be made the custodians of the park. The property was accepted by the State with this understanding, and the custodians have since devoted themselves to developing the park in accordance with both the letter and the spirit of the terms of the gift.

Mr. Letchworth had given much attention to the planting of trees, and, among other things, had had about 16 memorial trees planted. Among those who planted memorial trees may be mentioned Thomas Jamison, a son of the babe which the "White Woman of the Genesee" carried thither on her back from the Ohio River; John Jacket, grandson of the Seneca chief, Red Jacket; Mrs. Kate Osborne, granddaughter of the noted Indian chief, Joseph Brandt; Sir William Johnson, son of Sir William Johnson, the pioneer of Johnstown, N. Y., and vicinity; and the Hon. George W. Clinton, son of Governor DeWitt Clinton.

In the *Twelfth Annual Report* (1907) of the Preservation Society, attention was called to the possibilities which the park afforded for botanical education, and for a summer school in forestry and other nature studies. The principal trees in the park were named botanically in 1907, by Mr. George V. Nash, of the New York Botanical Garden, and labeled with lead labels, and in 1910 the Hon. Charles M. Dow, the chairman of the Letchworth Park Committee, proposed to the trustees of the society the development within the park of an arboretum on a larger scale than has hitherto been attempted in this country. The plan, as outlined, includes the planting of timber trees in small forests of not less than ten to fifteen acres each, with the object of supplying, in Mr. Dow's words, "not only knowledge for knowledge's sake, but also knowledge for practical use." In 1911 Mr. Overton W. Price was appointed forester of the Park, and the planting of the arboretum in accordance with the plan above suggested has already been begun under the supervision of Mr. Price.

With the growth of the institution, it is contemplated that a group of buildings will become necessary for administrative and educational purposes, and the first of this group, a museum and library building, is now in process of erection. The corner-stone was laid on Saturday afternoon, November 9, 1912, with

appropriate exercises, brief remarks being made by the Hon. Charles M. Dow, of Jamestown, N. Y.; Mr. Herbert L. Bridgman, of Brooklyn; Prof. Charles Delamater Vail, of Geneva; Mr. W. J. Humphrey, of Warsaw; Dr. Henry M. Leipziger, and Dr. Edward Hagaman Hall, of New York; and Dr. C. Stuart Gager, of Brooklyn. Letters of regret were read from Prof. L. H. Bailey, of Cornell University, and others who were unable to be present. Copies of the addresses and letters were among the papers deposited in the corner-stone.

Commenting on these exercises, the Brooklyn *Standard Union,* of November 17, 1912, says: "That the event was quiet and unobtrusive was certainly in keeping with the spirit and traditions of the place and to those who came from the cities and the campaign it was a welcome contrast to the tumult and the shouting, and crowds and parades, which are usually regarded as indispensable accessories to every public function."

C. S. G.

MEETING OF THE AMERICAN ASSOCIATION FOR THE PLANTING AND PRESERVATION OF CITY TREES

On Thursday evening, November 14, a meeting of the Association was held in the auditorium of the Central Museum, on Eastern Parkway. The president of the association, the Hon. George V. Brower, presided, and made the opening address on "The progress of the tree association," outlining the very considerable amount of work accomplished during the past season. Mr. J. J. Levison, Arboriculturist of Prospect Park, spoke on "Tree problems in our city streets," and Dr. C. Stuart Gager on "How the Brooklyn Botanic Garden can be of service to the Association for the Planting and Preservation of City Trees." It was here pointed out that the Garden cannot render services in the actual planting of trees outside the Garden, nor in their preservation by actual spraying or other treatment, but that it is able and more than willing to cooperate with all organizations and individuals in disseminating information about trees and their economic and aesthetic value, and in arousing public interest in

all that pertains to trees in both country and city. "An example of successful cooperation in neighborhood tree planting," was the subject of an especially interesting and suggestive talk by Mr. George C. Wood, of the department of biology of the Boys' High School, Brooklyn. Mr. Wood has been active in organizing the citizens of the block in which he lives into an association known as "The Lincoln Place Tree Association." A note on the work of this organization appears on page 21 of this issue.

At the close of the program as announced, Mr. Levison exhibited a number of colored lantern views of trees and the part they play in the Brooklyn parks and streets. We refer below to the work of the Junior Department of the association.

C. S. G.

ORGANIZATION OF CHILDREN FOR THE PLANTING OF TREES

At the suggestion of Miss Margaret W. Carmichael, of the Children's Museum, there has been organized a Junior Department of the American Association for the Planting and Preservation of City Trees. This department now has a membership of about 250 boys and girls of from 6 or 7 to 15 or 16 years of age. Every member is provided with a badge in the form of a small metal pin, on which is embossed a pine tree and the name of the organization. Each member is required to subscribe to a pledge, which contains a promise "to study, to protect, and to help plant trees whenever and wherever called upon."

The membership is divided into chapters, of which ten have been organized. Each chapter has its own officers, and confines its work to a definite section of the city. The active practical work of the Junior Department has found expression, among other ways, in the collection of waste paper, tinfoil, and old rubber. The material is sold, and the proceeds are devoted to furthering the purposes of the organization. The gathering of this material has the added advantage of giving the members at once some definite practical work to do. Up to last October the children had collected the almost incredible amount of over one ton of paper, 100 pounds of rubber, and 25 pounds of tinfoil.

This speaks remarkably well for the enthusiasm and earnestness of the members, and also for the ability of those who have the organization in charge to inspire the members.

On Saturday, October 19, seventy-eight members of the juniors visited the Garden, under the guidance of Miss Carmichael, and were shown by the Curator of Public Instruction some interesting features of tree life in the autumn. After the garden visit was over lunches were eaten in Prospect Park.

C. S. G.

CONFERENCE WITH HIGH SCHOOL TEACHERS

On October 19, 1912, invitations were sent to all high school teachers of biology in the boroughs of Brooklyn and Queens, whose names and addresses could be ascertained, to attend a conference on the following Saturday, October 26, at 10 a. m., at the Museum Building on Eastern Parkway. The purposes of the conference were to have the teachers meet the recently appointed Curator of Public Instruction, and to consider ways and means by which the Garden might become most useful to teachers and students in local high schools.

Twenty-five invitations were mailed, and eleven teachers attended. The New York Association of Biology Teachers was represented by its president, Mr. Richard W. Sharp, and the Department of Botany of the Brooklyn Institute, by its secretary, Miss Edith B. Brainerd, in place of the president of the department, Prof. Henry E. Chapin, who sent word that he was unable to be present. The Garden was represented by the Director and by the Curator of Public Instruction, Dr. Olive.

Dr. Gager briefly outlined the plan of development of the Garden, including the plantations, and the library, laboratory, and greenhouse facilities soon to become available, and emphasized the purpose of the Garden to make itself as helpful as possible to teachers of botany in local schools. Dr. Olive then went over, in detail, a tentative outline of educational activities to be inaugurated by the Garden, calling special attention to proposed ways of articulating with the work of the schools. Copies of this outline were distributed, and there followed a very interesting and suggestive discussion, participated in by most of

those present, and lasting about an hour and a half. As a result of the conference, the Garden will be able to plan more intelligently with reference to the above mentioned correlation.

E. W. O.

REPORT OF A TRIP TO BOTANICAL INSTITUTIONS

DR. C. STUART GAGER, Director,

Brooklyn Botanic Garden.

Sir:—I herewith submit a report on my recent visit to the Missouri Botanical Garden at St. Louis, and to the Phipps Conservatories and Phipps Hall of Botany at Pittsburgh. These visits were made in accordance with your earlier suggestion, during the journey east from South Dakota, to assume my new duties as Curator of Public Instruction in the Brooklyn Botanic Garden.

At St. Louis I spent the morning and part of the afternoon of August 31 at the Missouri Botanical Garden, or "Shaw's Garden," as it is perhaps better known locally. Through the courtesy of Dr. George T. Moore, the newly appointed director of the garden, and of Mr. Schramm, the assistant director, I was able to inspect fairly thoroughly, in the short time at my disposal, the plantations of the garden, the greenhouses and the laboratories.

The Missouri Botanical Garden, as is well known, was early (in 1885) closely associated with Washington University; and the Henry Shaw School of Botany, located at the garden, was founded at that time as a department of the university, the teaching being almost exclusively of an advanced character and carried on largely for graduate students. Some work of a more popular and elementary nature is, however, carried on, as is evidenced by their annual chrysanthemum shows, and by their free donation of living material from the garden and greenhouses, and by other aid to public schools. In contrast to our own garden, there is no official relation between the Missouri garden and the local municipal government, and assistance to public, as well as to private, schools, is given entirely on the initiative of the garden.

The magnificent endowment of the Missouri Botanical

Garden, bringing a net income of nearly $250,000 a year, heretofore largely consumed in taxes, street improvements, and other unproductive lines, promises soon to become more largely available for the direct development of the garden. The improved planted part of the garden consists of about 60 acres, while there still remain about 60 acres in field crops and pastures. When the present plans are consummated, and the new conservatories and new heating plant now building are finished, the garden will be one of the foremost developments of its kind in this country.

As was mentioned above, the Missouri Botanical Garden is of undoubted great educational value to the public and to the schools of St. Louis and environs. Teachers bring their pupils there at irregular but frequent intervals; the chrysanthemum displays delight large crowds at the fall flower shows; and study material is furnished to schools on request. Special displays also attract large numbers, such as the fruiting fig trees, growing outdoors along a stone wall which helps to protect them in winter, the aquatic gardens, the cactus houses, and the beds of medicinal plants. The new palm houses and conservatories, to be finished this fall, will contribute largely to the beauty and attractiveness of the garden.

To encourage the attendance of advanced students of botany, the Missouri Botanical Garden offers every year five research fellowships and one teaching fellowship, each of the value of $500. The fellows are all required to become candidates for higher degrees. Besides these, there are appointed six garden pupils, each of whom serves for four years, receiving $350 the first year and $380 thereafter, till the end of the appointment. The garden pupils, after a four-years' course in horticulture, landscape architecture, practical gardening, and greenhouse management, generally go into the work of city parks and the management of private estates.

The equipment for research work at the Missouri Botanical Garden is quite complete along certain lines. The herbarium is one of the largest in the country, comprising nearly a million sheets; while there are twelve thousand species of living plants growing in the garden and greenhouses. The library is large. comprising about 70,000 volumes and pamphlets, each pamphlet

being bound separately, and the laboratories are fairly well equipped. The scientific staff comprises, besides the director, Dr. George T. Moore, the plant physiologist, Dr. B. M. Duggar, who only recently assumed his position with the garden, and Dr. Hermann von Schrenk, honorary plant pathologist.

The visit to the Phipps Conservatories and Phipps Hall of Botany,* Pittsburgh, was made on September 9, 1912. Your letter of introduction to Prof. Edgar Rynearson, Director of High Schools, was duly presented. Professor Rynearson kindly gave me directions for finding the institutions which I desired to inspect, and referred me to Dr. David R. Sumstine, of the Peabody High School, for further information. Dr. Sumstine, besides being in intimate touch with the teaching of botany in the High Schools of Pittsburgh, is an assistant in the section of botany in the Carnegie Museum. I am much indebted to Dr. Sumstine for courtesies accorded me. Unfortunately I was unable to have the further guidance of Mr. Otto E. Jennings, the Curator of Botany of the Carnegie Museum, to whom Dr. Sumstine further referred me, as he had not yet returned to the city from his Canadian collecting trip. The Carnegie Museum, as will be remembered, is located near one of the main entrances to Shenley Park, while the Phipps Conservatories and Phipps Hall of Botany are located back in the park, over a quarter of a mile from the museum building. This distance, as was later pointed out by Dr. Sumstine, presents some disadvantages in connection with the transporting of pupils to the conservatories and hall of botany. The distance which the pupils must walk from the nearest car-line to the Phipps laboratory, and the consequent loss of time, presents, in fact, such a serious obstacle that, combined with other disadvantages, it has caused some modification of plans, at least for the present, in regard to the use of the Phipps Hall of Botany for teaching purposes. In this connection, it is of interest to recall the central location of our own Garden, affording, by several rapid transit lines, easy access to the pupils and teachers in most of the public and private schools of Brooklyn.

Respectfully submitted,

3 October, 1912. (Signed) Edgar W. Olive,
Curator.

---

*Cf. Brooklyn Bot. Gard. Record 1: 67-70. 1912.

REPORT OF A TRIP TO ROCHESTER AND TO THE ARNOLD ARBORETUM

DR. C. STUART GAGER, Director.

Sir:—I take pleasure in presenting the following report of my trip to Rochester and to the Arnold Arboretum, on October 21-25, to arrange for the purchase and exchange of specimens of woody plants. Two days were spent at Rochester and three days at the Arnold Arboretum.

From the latter institution the Garden secured 514 species of shrubs, trees and vines, all purchased, represented by one or sometimes two or three specimens of each kind. More than 375 of the species secured were collected by Mr. E. H. Wilson during four trips to western China, and it is these Chinese plants that add so much to the botanical value of the collection. The rest of the 514 species are, in part, rare and otherwise interesting plants, many of them also from China, and collected by Mr. W. Purdon, the remainder being of general botanical and horticultural interest. The Garden is very fortunate in being able to secure these plants at this time, as in many ways the collection is unique. The arboretum, at great expense and a large outlay of Mr. Wilson's time, has secured perhaps the rarest collection of Chinese woody plants in existence. Through the cooperation of Prof. C. S. Sargent, the director of the Arnold Arboretum, the Garden had the opportunity of choosing the material mentioned above. I spent three days with Mr. Wilson in going over their nurseries and selecting the species of which they were willing to spare a plant or two.

There are more than 127 genera of woody plants in the collection secured at the arboretum, and many of these are extremely rare in cultivation. Among the most interesting botanically are the Japanese Lacquer Tree *(Rhus vernicifera)*, the original home of which is China, *Paliurus orientalis*, of the Buckthorn family, *Paliothyrsis sinensis*, of the Flacourtia family, and many more.

The well known affinity of the flora of eastern Asia with that of eastern North America is particularly well illustrated in this collection. Many native shrubs and trees find their prototypes in the mountains of China, and the Wilson collection is rich in

such specimens. Oaks, birches, willows, hydrangeas, barberry, ashes, pines, firs, and spruces, all common in the Eastern States, are represented by many species in this valuable collection. Among the oaks there are 16 species from China alone, besides 4 other species from other parts of the world. In the birches there are 15 Asiatic species, 12 of which are from China, the others from Siberia. *Salix,* the willow, is not so common in China as with us, only 8 Chinese species being secured. Our single wild hydrangea *(H. arborescens)* is represented in China by 5 species of the Wilson collection, one of which, *H. anomala,* is a vine. Our only local species of barberry, *Berberis canadensis,* finds many relatives in China, apparently the ancestral home of the Barberry family. There are more than 35 Chinese species now in our collections, all of which came from the arboretum. Unfortunately, the arboretum has only small seedling plants of the pines, spruces and firs, except a few large specimens, and we have secured altogether only 10 coniferous species. There must be at least 30-40 coniferous species in the cold-frames at the arboretum, and as many rhododendrons and azalias. All of these could be secured next autumn, as well as some other things which it was judged too hazardous to move, in view of the unfinished state of our greenhouses.

Another very desirable acquisition to our collections is a specimen of the Buffalo-nut *(Pyrularia).* This shrub, reputed to be wholly parasitic on the roots of the hemlock, is therefore almost impossible to cultivate. Mr. Jackson Dawson, the head gardener at the arboretum, has succeeded in getting some seedlings of *Pyrularia* established in pots in which the hemlock is growing as the host plant. This was done by sowing seed of the Buffalo-nut in the pot in which the hemlock had already attained a height of a foot or two. The sprouting seedlings of *Pyrularia* became attached to the roots of the hemlock, and the two plants grow in the same pot, the subsequent existence of the *Pyrularia* depending on the close association thus early secured. Our specimen is about two years old and in a very vigorous condition. Professor Sargent also kindly picked out a set of 25 species of thorns (*Crataegus*), in as many representative groups as possible, for the wild flower garden. All of these are native within 100 miles of Brooklyn. A very complete set of native shad-

bushes *(Amelanchier)* completes the native representatives of this genus.

Upon the completion of the first section of the greenhouses next year, I think it would be desirable for the Garden to secure as much more of the Wilson collection as possible. A great many plants were left this year owing to inadequate accommodation for such material at the Garden. Next autumn, before the plants are too large and expensive for profitable removal, would, I think, be a good time to get as much more as we can secure. The number of broad-leaved evergreens, azaleas, rhododendrons, *Pieris,* and conifers that we might get at that time would be very great.

During a two days' visit at Rochester, I visited all the parks in the city, under the guidance of Park Superintendent C. C. Laney and his assistant, Mr. John Dunbar. This beautiful system of parks, 1600 acres in extent, is probably the richest botanically of any municipal park system in the country.

Through the courtesy of Messrs. Laney and Dunbar, I was able to get about 130 species of shrubs and trees new to our collections. This was arranged as an exchange between the Board of Park Commissioners of Rochester and the Garden, and our obligation to that board is very great. The collection is a very representative one botanically, including 13 willows, which we particularly desired for the planting of the artificial brook.

Among the barberries, 7 species were received, in addition to the 35 mentioned above, making our collection of these plants a very excellent one. Six rare species of *Cotoneaster,* a genus of usually low-growing, half-evergreen relatives of the apple, were also secured. These make attractive autumn features, with their small, usually scarlet, apple-like fruits.

Mr. Dunbar, who has for many years been a student of the genus *Crataegus,* has many thousands of them growing in the nurseries at Rochester. Twelve representative species from among this group were selected, none of which are native close to New York, thus supplementing the local *Crataegus* from the Arnold Arboretum mentioned above.

All the plants except the willows, mentioned above, have been put into the nursery. Subsequently they will serve as the

basis of our shrub and tree collection, most of them going on the central meadow when more detailed plans for the arrangement of the general systematic collection have been developed.

Respectfully submitted,

(Signed) NORMAN TAYLOR,
Curator of Plants.

1 November, 1912.

SCHOOL GARDENS IN CEYLON

A number of publications that would not ordinarily be seen by American readers, but which contain matters of interest to those engaged in school garden work, have recently been received by the Garden library from Mr. C. Drieberg, Superintendent of School Gardens at Colombo, Ceylon. Four of these publications are entitled *Teachers' Leaflets,* are numbered from 1 to 4, and are issued by the School Garden Department of the Royal Botanic Gardens in Ceylon.

In Leaflet No. 1 it is stated that the circular is being sent to teachers for their guidance, and it contains information under three heads: (1) Object of school gardens; (2) Conditions under which they are worked; (3) Points in the judging of gardens. Under the first head are enumerated twelve objects of school gardens, among which the following are worthy of notice:

(a) To brighten the surroundings of the school, and make it what it ought to be, viz., a pleasant resort for the boys and not a bare and unattractive building.

(d) To furnish a field for nature study, *i. e.,* the study of natural objects in their natural surroundings.

(f) To give a practical turn to school life, and to provide a training in elementary agricultural science.

(j) To awaken in school children a new interest in the cultivation of plants, and instill into them a love of nature, and so reconcile them to a country life and to agricultural pursuits.

(k) To encourage school children to establish gardens at their homes.

Under the second heading are enumerated six conditions under which school gardens are worked, among which the three following may be noted:

(a) Any school which presents possibilities for school gardening will be furnished with a stock of implements, and supplied with seeds from time to time: where required, fencing wire will also be supplied.

(e) The school gardens will be inspected periodically by the superintendent and his assistants, and prizes will be awarded by the department to teachers who show the best results.

(f) A certificate will accompany each prize, setting forth the nature of the award, etc., and certificates of honorable mention will also be awarded to deserving teachers.

Twenty points are given which are to be considered in the judging of school gardens, among which are area cultivated, situation and lay of the land, climate and rainfall, number and variety of plants grown, arrangement of plants and trees, lawn and playground, school garden records, activity and intelligence of scholars, care of implements, and aptitude and interest shown by the teacher.

The second leaflet contains information about the ordering of seeds for school gardens, which are supplied by the Superintendent of School Gardens from the Government stock gardens, but after any given garden has received its first supply of seeds from the Government, it is expected that it will, for the most part, raise its future supply for itself.

Leaflet No. 3 is entitled, "A Few Plain Words to Teachers," and among other good advice given, six difficulties are named which are often raised by teachers against the possibility of doing school garden work. Trenchant replies to all these difficulties are given by the superintendent, who states that the poorest excuse which a teacher can make is, that school boys or their parents object to outdoor work. He replies, "If he [the teacher] cannot persuade the boys to work with him in the garden, he does not deserve to hold his place."

The fourth leaflet contains information about garden tools, which are also supplied by the Department of School Gardens on condition that they be made good use of and are properly cared for. The list of tools contains a number which are quite unheard of in America, as, for example, an *alavangoe,* for digging holes for fence posts and for large plants; *mammoty,* used

for a variety of purposes; *quintannie,* for breaking up and digging very hard soils, severing large roots, etc.

In the Administrative Report of the Director of the Royal Botanic Gardens at Ceylon, for 1910-11, Part 4, information is given, on page C-20, about the school gardens under the jurisdiction of the Royal Botanic Gardens. It is very interesting to notice here the extent to which the school garden idea is spreading. According to a statement given, the number of school gardens listed has risen from 224 in 1910, to 246 in 1910-11, and it is further stated that the movement is steadily spreading to non-Government schools, most of which are in the hands of missionaries. The Director of School Gardens also states that he is constantly receiving inquiries from outside the Island of Ceylon for information regarding the work of school gardens, and has submitted a paper on the subject to the Director of the Royal Botanic Gardens, who is bringing it out as a departmental circular. This circular, he states, with a map of the island showing the distribution of school gardens, and illustrations of the Government Stock Garden and up-country and low-country school gardens, should furnish the necessary information for organizing work on similar lines elsewhere. Definite arrangements have been made for bringing the garden into closer touch with the routine work of the school, and for emphasizing the educational value of school gardens. A Teachers' Manual of Nature Study, as well as Agricultural Readers for the Fourth and Fifth Standards, will before very long supply a necessary link between the literary and the practical sides of the school curriculum.

In order to arouse the interest of both children and their parents in these activities, school and "school-cum-village" shows are organized, and a public spirited citizen in one of the Districts awards annually a prize shield to the best school garden in each korale. Another public spirited resident gives annually 50 Rupees (about $15) for school garden prizes.

C. Stuart Gager.

LINCOLN PLACE TREE ASSOCIATION

One of the outgrowths of the work of the American Association for the Planting and Preservation of City Trees is the organization of the Lincoln Place Tree Association. This organization was formed on April 16, 1912, "for the definite object of improving the condition of the block," and during the past season twenty-one trees have been planted by the members, at an expense of over $200. Further planting of Norway maples is planned for next spring.

In line with the work of the Junior Department of the Tree Planting Association, the boys and girls of the block have been organized, and are collecting and saving materials which are to be sold and the proceeds devoted to the planting of trees. The association is also encouraging the placing and planting of window boxes and urns, the planting of hedges, and the improvement of lawns. The president is Mr. George C. Wood, of the department of biology of the Boys' High School, Brooklyn, and a member of the department of botany of the Brooklyn Institute. Mr. Arthur Pratt is the secretary of the association, and Mr. Albert Roessle its treasurer.

NOTES

Preliminary installation of the coniferous collection was completed during August and September. The different genera have been grouped around the lake according to a scheme developed by the Consulting Landscape Architect and the Curator of Plants. There are now in the collection representatives of 18 genera and 132 species and varieties. In *Pinus, Picea, Juniperus, Abies,* and *Chamaecyparis* there are 17 species or more represented. In most cases we have two plants for each species in the collection, thus guarding against possible loss. Some genera, such as *Torreya, Cephalotaxus, Fitzroya, Cunninghamia* and *Libocedrus,* are being tried as to hardiness. It is expected that some of these may prove hardy and thus increase the number of coniferous plants cultivable near New York.

The Regents of the University of California have officially set aside for botanical purposes a portion of the university

campus comprising 380 acres, and plans are now being perfected for developing the area as a botanic garden. The new garden will include an arboretum and a fruticetum and the arrangement of the plantations will be geographic and ecologic. The present garden has an area of only five acres. Like the old garden, the new one will be under the directorship of Prof. William A. Setchell, with Prof. H. M. Hall in immediate charge.

We have received a copy of the *Announcement* (August, 1912), of the Ranger School of the New York State College of Forestry, at Syracuse University. The Ranger School, located at Wanakena, N. Y., covers a belt of country over three miles long and comprising 2000 acres of forest land in St. Lawrence county. It has an average elevation of 1500 feet, and includes Cranberry Lake, the largest in the Adirondacks. The curriculum includes both theoretical and practical courses, including silviculture, forest surveying, estimating and mapping, forest protection, and methods of lumbering. The ranger school is open, free of tuition, "to men over 18 years of age who present certificates of good character and perfect physical condition." There is a five year course leading to the degree of master of forestry. A summer camp is announced to be held on Upper Saranac Lake during August, 1913.

The New York State College of Forestry, at Syracuse University, had two interesting exhibits at the New York State Fair at Syracuse in September, 1912. One was an exhibit of tree seeds, seed beds, and forest plantations, and the other an exhibit of a simple plant for treating posts by boiling in creosote oil, showing how the durability of fence posts, shingles, and other farm timbers could be increased. In connection with each exhibit there was distributed a brief guide, giving information on the subject of the exhibit. The pamphlets, copies of which are in the Garden library, are admirable for the purpose intended.

In his lecture before the Department of Botany on September 12, Professor de Vries described the peloric (five spurred) toad-flax, and his experiments demonstrating the production of a peloric strain from the normal by mutation, rather than by

a process of selection of fluctuating variations. On September 25, Mr. John McCallum, a member of the department, brought several live hemipeloric plants to the Garden, for the Evolution Section, and also for experimental use. On September 27 he brought a second lot. These were found near Morris Park, L. I.

On October 11 the Garden was visited by Prof. Roland Thaxter, of Harvard University. Prof. Thaxter is on his sabbatical leave of absence during the current academic year, and sailed on October 11 for Trinidad and adjacent regions, where he will spend several months collecting both botanical and entomological specimens, particularly for the purpose of enlarging his enormous collections of Laboulbeniaceae. He will be assisted in this work by Mr. J. B. Rorer, a former student with Dr. Thaxter, who is now the Mycologist of the British Government on the Island of Trinidad.

On the afternoon of October 19 the senior class of the Yale School of Forestry, to the number of about 25, visited the Garden under the guidance of Mr. J. J. Levison, Arboriculturist of the Park Department of Brooklyn, and instructor at Yale. They were met by the Director of the Garden, and inspected the work of soil preparation for the planting of willows and alders along the brook, and also the recent evergreen planting around the margin of the lake.

In the preceding number of the RECORD we recorded the action of the Board of Estimate of New York City, by which about three additional acres of land adjacent to Mt. Prospect Reservoir were transferred to the Brooklyn Institute for botanic garden purposes. During October, November, and December workmen from the J. L. Mott Iron Works have been engaged in removing the iron boundary fence and resetting it along the new party line.

The work of enclosing the northeast wing of the conservatories was completed on December 7. The work on the laboratory building, which remained practically stationary for over eight weeks, owing, in part, to a delay in the delivery of the steel trusses for the roof, was resumed on December 9.

On December 4 the Committee on Botanic Garden of the Trustees visited the Garden, and in company with the director and other members of the staff, inspected the work done during the past season, and that now in progress on the grounds and buildings.

Owing to the unusually open character of the season during the past fall, it was possible to continue our gardening operations to a much later date than last year. The *per diem* laboring force was retained until November 22, which was twelve days later than last year, and the regular monthly force were able to continue bed-making and soil transfers until as late as Christmas.

After an extended trip through the southern states and Cuba, Prof. de Vries returned to New York on December 5. He lectured before the New York Academy of Sciences on the evening of December 6, and at Princeton University on December 7. On the afternoons of December 6 and 9, he conducted informal seminars at Columbia University, under the joint auspices of the university departments of botany and zoology, on "The mutation theory and its bearings on evolution and genetics." These seminars were largely attended. Prof. de Vries sailed for Holland Tuesday morning, December 10, on the Nieuw Amsterdam.

The Brooklyn Institute of Arts and Sciences

Officers of the Board of Trustees

President—A. AUGUSTUS HEALY
First Vice-President—HON. CHARLES A. SCHIEREN
Second Vice-President—HON. CARLL H. DeSILVER
Third Vice-President—COL. ROBERT B. WOODWARD
Treasurer—CLINTON W. LUDLUM
Secretary—HERMAN STUTZER

Executive Committee

A. AUGUSTUS HEALY

E. Le GRAND BEERS
DR. GEORGE W. BRUSH
HON. WILLIAM J. COOMBS
THOMAS T. BARR
WALTER H. CRITTENDEN
HON. CARLL H. De SILVER
GATES D. FAHNESTOCK
CLINTON W. LUDLUM
DICK S. RAMSAY
HERMAN STUTZER
ALFRED T. WHITE
COL. ROBERT B. WOODWARD

Committee on Botanic Garden

ALFRED T. WHITE

GATES D. FAHNESTOCK
GEORGE D. HEARN
GEORGE D. PRATT
WILLIAM A. PUTNAM

Ex Officio Members of the Board

THE MAYOR OF THE CITY OF NEW YORK
THE PRESIDENT OF THE BOROUGH OF BROOKLYN
THE COMMISSIONER OF PARKS, BOROUGH OF BROOKLYN

PROF. FRANKLIN W. HOOPER, *Director*

PUBLICATIONS
OF THE
BROOKLYN BOTANIC GARDEN

RECORD. Established January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the annual report of the Director and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Department of Botany of the Institute. To others one dollar a year; 25 cents a copy.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

1. *The Educational Work of Botanic Gardens.* 13 pages. 1911.

2. *The Purpose of an Introductory Course in Botany.* 8 pages. 1911.

3. *Cryptomeric Inheritance in Onagra.* 11 pages, figs. 2; plates 2. 1911.

4. *On the Origin and Present Distribution of the Pine-Barrens of New Jersey.* 15 pages, figs. 2. 1912.

5. *Ingrowing Sprouts of Solanum tuberosum.* 10 pages, figs. 6; plate 1. 1912.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

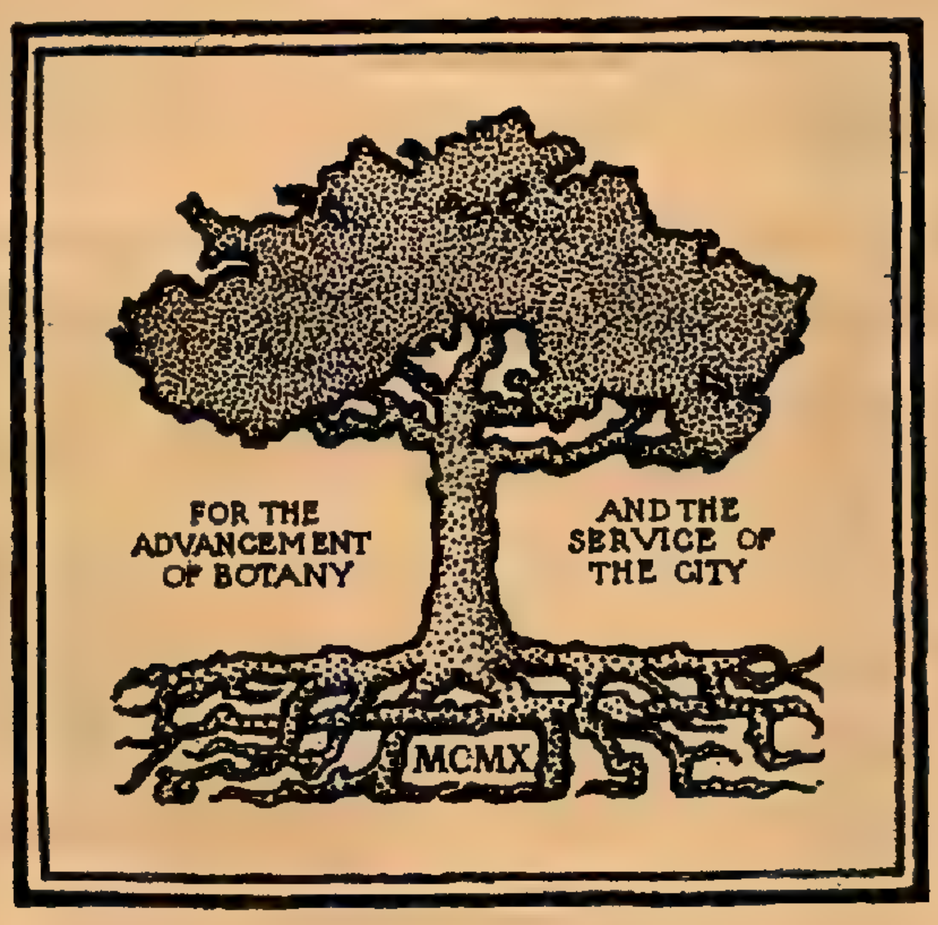
1. *The Brooklyn Botanic Garden.* Price, 5 cents.

BROOKLYN BOTANIC GARDEN

RECORD

VOL. II APRIL, 1913 No. 2

EDITED BY
C. STUART GAGER



CONTENTS

PAGE

Second Annual Report of the Brooklyn Botanic Garden, 1912 25
Report of the Director 25
Report of the Curator of Plants 46
Report of the Curator of Public Instruction 60
Report of the Secretary and Librarian 67
Financial Statement 71
Appendix 1: Amended Agreement of September 9, 1912 75
Appendix 2: Municipal Action on the Amended Agreement 79
Appendix 3: Municipal Action on Appropriations for Buildings 80
Appendix 4: Municipal Action on the Tax Budget for 1913 81
Appendix 5: Resolutions Approving the Issue of Corporate Stock . . 81
Appendix 6: Resolutions of Board of Estimate and Apportionment Approving Transfers in the Tax Budget for 1912 . . 83

PUBLISHED QUARTERLY
BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
AT 65 DUANE STREET
NEW YORK, N. Y.

[Entered at the Post Office at New York, N. Y., as Second Class Matter]

Botanic Garden Staff

DR. C. STUART GAGER, *Director*

MR. NORMAN TAYLOR, *Curator of Plants*

DR. EDGAR W. OLIVE, *Curator of Public Instruction*

DR. WILLIAM MANSFIELD,
Honorary Curator of Economic Plants

MISS BERTHA M. EVES, *Secretary and Librarian*

MR. HAROLD A. CAPARN, *Consulting Landscape Architect*

MR. JOHN V. BORIN, *Head Gardener*

MR. HERMANN KOLSH, *Foreman*

McKIM, MEAD & WHITE, *Architects*

OLMSTED BROS., *Landscape Architects*

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
BROOKLYN BOTANIC GARDEN
FOR THE ADVANCEMENT OF BOTANY AND THE SERVICE OF THE CITY
FREE TO THE PUBLIC DAILY
OPEN FROM 8 A.M. UNTIL SUNSET
SUNDAYS AND HOLIDAYS AT 10 A.M.
DO NOT PICK OR BREAK FLOWERS, LEAVES OR BRANCHES
LUNCHES MUST NOT BE EATEN IN THE GARDEN
DOGS NOT ADMITTED
PFLUCKEN ODER BRECHEN VON BLUMEN, BLATTERN, ODER ZWEIGEN
IST STRENGSTENS VERBOTEN
HIER DARF NICHT GEGESSEN WERDEN
HUNDE NICHT ERLAUBT
È PROIBITO SEVERAMENTE COGLIERE O ROMPERE FIORE, FOGLIE,
O RAMOSCELLI
È PROIBITO DI MANGIARE NEL GIARDINO
I CANI NON SONO AMMESSI
GARDEN CLOSES
TO PAY AT 6

FIG. 5. Entrance sign.

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN RECORD

VOL. II New York, N. Y., April, 1913 No. 2

SECOND ANNUAL REPORT OF THE BROOKLYN BOTANIC GARDEN, 1912

REPORT OF THE DIRECTOR

TO THE COMMITTEE ON BOTANIC GARDEN.

Gentlemen:—I have the honor to submit herewith the second annual report of the Brooklyn Botanic Garden of The Brooklyn Institute of Arts and Sciences for the year ending December 31, 1912.

Temporary Headquarters

Owing to the non-completion of our own buildings, the temporary offices of the Garden have continued in the Central Museum building, on Eastern Parkway. Portions of three rooms have been occupied during the year; one by the director and the secretary and librarian, one by the curator of plants and the garden aid, and one by the curator of public instruction. In addition, we have occupied considerable storage space in the basement.

Amended Agreement with New York City

On September 9, the amended agreement between The Brooklyn Institute of Arts and Sciences and the City of New York, touching the Brooklyn Botanic Garden, was executed by the Mayor. By this agreement, two parcels of land, of about three acres in area, adjacent to Mt. Prospect reservoir, were transferred to the department of parks of the Borough of

Brooklyn, for use as a botanic garden and arboretum, and the Institute was authorized to expend the principal or interest of its endowment fund of $50,000 for the purchase of plants, flowers, and trees, *or for other purposes* in connection with said botanic garden and arboretum. (See Appendix 1, p. 75.)

Building Operations

As stated in the first annual report (Brooklyn Bot. Gard. Record **1**:26. 1912), the lowest bid received for the construction of the first section of our laboratory building and plant houses was that of Cockerill & Little Co., $55,800. This was $3,765 in excess of the architects' estimate. On January 4, 1912, a resolution was adopted by the board of estimate and apportionment (*City Record* **40**: 256. 11 Ja 1912), approving of $55,800 as a new estimate of cost, and on January 18 the contract was awarded to Cockerill & Little Co. by the board of park commissioners. The contractors were directed to begin work on April 1, and to complete the same in 150 working days. On April 2 the site of the buildings was surveyed, and excavation began on April 8.

Work progressed until the latter part of August, when there followed a delay lasting about four months. This was attributed by the contractors chiefly to the failure of subcontractors to deliver the steel work for the roof. Work was not resumed until December 9. On December 17 the work of enclosing the first section (northeast wing) of the conservatories was completed.

The 150 working days originally allowed for completing the work expired on November 7, and the contractors were granted an extension of time of 90 working days. This extension, counting out Sundays and holidays, would bring the period to a close on about March 1, and with additional allowances for bad weather, to about April 1, 1913.

Second Section of the Conservatories

During the year plans and specifications for the second section (the central palm house) of the conservatories were prepared by the architects, were advertised for bidding, and bids were opened on October 17. The highest bid was $31,000, from the contractors for the first section, Cockerill & Little Co.; the

lowest was $24,878, from William J. Thompson. Formal protest against awarding the contract was filed by two builders of greenhouses, on the ground that the specifications for the superstructure did not include the words "or equal thereto." The office of the corporation counsel advised that in this respect the specifications did not conform to the legal requirements, and that the contract should not be awarded. The specifications were therefore referred back for revision, reprinting and readvertising. Up to December 31 this work had not been completed. (See Appendix 2, p. 79.)

The Grounds

Supervision: As in 1911, so during 1912, the curator of plants has acted also in the capacity of superintendent of grounds, having immediate charge of both the gardening and the general maintenance and construction forces.

Patrol of the grounds: By the Agreement of December 28, 1909, between the Institute and the City, paragraph 12, the City agrees to furnish at all times adequate police protection. Were the grounds merely a public park this police protection would be sufficient, but the nature of our plantations, composed, as they are, of carefully recorded and labeled specimen plants of scientific and educational as well as of ornamental value, renders it obviously essential that they should be under constant supervision and surveillance by an officer, or officers, directly responsible to the Garden. In this way, not only are valuable collections given suitable oversight, but the Garden official is able to serve the public by giving information about the collections and the work of the Garden. This work is provided for, *ipso facto,* during the hours when the gardeners are at work. On Sundays and holidays two men are specially detailed to patrol the grounds in uniform, and to be responsible for the opening of the gates in the morning and closing them at night. On other days one of the gardeners, in uniform, patrols the grounds during the noon hour.

New gate signs: A photograph of one of the signs placed at each of the entrance gates is reproduced in figure 5. The sign announces the hour of opening and closing, and gives, in English, German, Italian, and Yiddish, the Garden regulations concerning

the picking of flowers, the eating of lunches, and the exclusion of dogs.

Hours of opening and closing: After a year's observation it was found that the comfort of the public would, for the present, be assured by opening the gates at 10 a. m. on Sundays and holidays, and at 8 a. m. on other days. The hour of closing is an arbitrary but fluctuating one, determined by the hour of sunset, and varying from 4:30 p. m. near the winter solstice, to 7 p. m. near the summer solstice. The gate signs contain a provision for announcing this change of time two or three days in advance.

Attendance: The absence of turnstiles at our gates, and the fact that we have not yet been able to station guards at the entrances, have made it impossible to secure an accurate record of attendance. It has been clearly evident, however, during the past season, not only that the general attendance is increasing, but that an increasingly large number of teachers with classes visit the Garden in connection with their school work. (See the report of the curator of public instruction, *infra*, p. 64.)

FIG. 6. Laying the foundations for Section 1 of the laboratory building. May 9, 1912.

Soil improvement; grading; construction of brook: The most important of our operations on the grounds have been the completion of the soil improvement on the central meadow, the grading of the southern half of this area, and the construction of the artificial brook. The scheme of soil improvement followed was outlined in the first annual report, and the details of this work, together with the grading and the construction of the brook, are given in the accompanying report of the curator of plants. In excavating for our laboratory building, the contractors fortunately uncovered a layer of blue clay, which furnished sufficient material for lining the bed of the brook.

There were two important gains in having the above mentioned work done by day's labor by our own force, rather than by having it done by contract. In the first place, it was done more promptly. We shall now be able to plant this area during 1913, but otherwise the planting would doubtless have been delayed at least six months or a year, as the specifications for grading the remainder of the area have not yet been prepared.

In the second place, the work was done more cheaply. It was estimated by the landscape architects that it would cost $5,000 to build the brook, and about $40,100 for top-soiling the area, or a total of $45,100 for all operations. The total cost of the grading and the brook (allowing $500 for work yet to be done) is $2,923.61, and the total cost of the soil improvement ($1,303.64 in 1911 + $985.89 in 1912) is $2,289.53, making a total for all work of $5,213.14. This amounts to a saving of ($45,100—$5,213.14) $39,886.86 over the estimated contract figure. Or, to state it another way, the soil improvement, grading, and construction of brook have all been accomplished for only about $200 more than the estimated cost of the brook alone.

Removing and resetting the iron fence: The tax budget for 1912 included an appropriation of $1,500 under replacements and repairs. The appropriation was asked for primarily to meet the expense of removing the iron boundary fence between the Garden and Mt. Prospect reservoir property, and resetting it along the new party line. After failure to secure bids from six different contractors, the contract was awarded to The J. L. Mott Iron Works to do the work, according to specifications, for the sum of $957.00. The low figure of the bid, as compared with

the amount estimated, is explained partly by the fact that it was finally decided not to remove, for the present, about 230 feet of the fence on the east boundary, extending from the Museum building to Eastern Parkway, and partly to the fact that the bid did not cover the cost of surveying, and of doing necessary grading along the new fence line. The balance of the appropriation was applied toward repairing and painting the street fence enclosing the Garden. The work of resetting the fence was not quite completed before January 1, 1913.

Repairing and painting the street fence: The iron fence enclosing the Garden along Washington and Flatbush avenues and the southern boundary of the Garden was badly in need of painting and repairs, and an agreement, authorized by the Chairman of the Committee on Botanic Garden, was entered into with the Mott company to do the repairing at an expense of ten dollars ($10) a day for labor, plus the cost of necessary materials. This repair work was still in progress, but nearly completed, on December 31.

Walks: The Garden contains no driveways, but gravel footpaths only, and driveways are not provided for in the new plan adopted for the grounds. The large amount of teaming incident to building, grading, *et cetera,* has given the paths very hard usage. These facts emphasize the necessity of adopting such a type of construction for the new paths that they will stand a reasonable amount of teaming, such as will always be necessary in connection with ordinary gardening operations.

New tool house: The increase in our tools and implements, and the need of more shelter room for various purposes, made necessary the erection of a third frame tool house in our service yard. This building, measuring 15x30 feet, was completed on August 10.

Development of the Plantations

A table showing the classification of the plantations into ten sections was given in the first annual report (Brooklyn Bot. Gard. RECORD 1: 31-32. Ap 1912). The development of three of these sections, the local flora, the morphological, and the economic, was begun in 1911. During 1912 the economic section, which was only a temporary installation, was continued, substantially as in the preceding year; the morphological section

FIG. 7. Beginning the superstructure. Laboratory building and conservatories; Section 1. July 22, 1912.

received some additions and revisions; and the local flora section was greatly enlarged, both as to number of species and number of beds. One of the most important and popular of the added features was the shaded path, opened through the trees and shrubs on the border mound at the west edge of the section, and planted with large numbers of the native wild flowers that require shade. Further details of these operations are given in the accompanying report of the curator of plants (pp. 46-59), *infra*).

During the year many plants for the systematic section were started, and over 640 different species of shrubs, trees, and vines were obtained by purchase and exchange. The initial planting of the pinetum, grouped around the lake and comprising 18 genera and 132 species and varieties; the enlargement of the nursery, and the planting of willows and alders along the brook, and of twenty species of hardy water-lilies in the lake, is referred to in detail in the report of the curator of plants.

Appointments

During 1912 four appointments were made to the staff, as follows:

January 1. Mr. Harold A. Caparn, as consulting landscape architect. During 1911 the need was felt of a local consulting landscape architect, who might be readily and frequently consulted with reference to the details of the plan of the landscape architects, Messrs. Olmsted Bros., whose offices are in Brookline, Mass. The appointment was made with the hearty approval of the landscape architects. Mr. Caparn was the landscape architect of the city parks of Yonkers, N. Y., Corning, N. Y., Newark, N. J., and of the Zoological Park in New York City, from 1901 to 1906. He was also president of the American Society of Landscape Architects for 1912, and is lecturer in landscape architecture in Columbia University. The experience of the past year in laying out our plantations has demonstrated the wisdom of having such a member on our staff, especially during these early stages of the development of the grounds.

May 1. Dr. William Mansfield, as honorary curator of economic plants. Dr. Mansfield's duties will be chiefly with reference to the medicinal plants, which are to form a division of our economic section. He is professor of pharmacology in

the College of Pharmacy, of Columbia University, and one of the editors of the *Practical Druggist*.

September 1. Dr. Edgar W. Olive, as curator of public instruction. Details of Dr. Olive's appointment were published in the Garden RECORD for October, 1912. He came to the Garden from South Dakota, where he was state botanist, and professor of botany in the State College. Until the work assumes larger proportions, Dr. Olive is also serving as plant pathologist for the Garden.

September 1. Mr. Cullen Adlerblum as garden aid. Mr. Adlerblum graduated from the College of the City of New York in June, 1912, and served as student assistant in the Garden from July 1 to September 1, without salary.

Trips

From March 19-21 the director of the Garden was in Philadelphia, on leave of absence, representing the Garden and also serving as delegate of the University of Missouri and of the Torrey Botanical Club at the celebration in honor of the one hundredth anniversary of the Philadelphia Academy of Natural Sciences.

On May 9 a visit was made to Pittsburgh to inspect the Phipps Hall of Botany and the Phipps Conservatories. A full report of this trip, including a description of the work carried on at the Phipps Hall in co-operation with the botanical instruction in the local high schools, is printed in the Garden RECORD for July, 1912.

On July 8, 1912, the director and the curator of plants visited the botanic garden at the Central Experimental Farm of the Dominion Government, at Ottawa, Canada, and the laboratories at McGill University, Montreal. At Ottawa arrangements were made for obtaining a number of plants as an exchange courtesy, and at Montreal many suggestions were obtained that will be of material help in planning the details of our own laboratories.

The curator of plants spent the week of June 3 at the Arnold Arboretum, studying their collections and arranging for securing cuttings of shrubs for our Garden. On his return trip a visit was made to the botanic garden of Smith College. On June 30 Mr. Borin, head gardener, and Mr. Lemborg, gardener, went

to the arboretum to secure the cuttings, Mr. Borin returning with part of them on July 2, and Mr. Lemborg with the remainder on the following day.

The appended report of the curator of plants (pp. 46-59) refers to his trip, on October 21-25, to visit the park department at Rochester, N. Y., and to the Arnold Arboretum, at Jamaica Plain, Mass. At Rochester about 130 species of shrubs and trees, new to our collections, were obtained as an exchange courtesy, and at the Arnold Arboretum 514 species of shrubs, trees, and vines were purchased, including representatives of over 375 species of Chinese plants from the Wilson collection.

The curator of public instruction also gives a report of his visits to the Missouri Botanical Garden and the Phipps Hall of Botany (p. 60 *infra;* and Brooklyn Bot. Gard. RECORD, **2:** 12-14. Ja 1913).

On November 7-9 the director was absent on leave to attend the laying of the corner-stone of the new museum and library building of the Letchworth Park Arboretum, in the Genesee Valley, near Castile, N. Y.

The Garden was represented by the director at the annual meeting of the Botanical Society of America, at Cleveland, Ohio, during the last week in December, and by the curator of public instruction at the annual meeting of the American Phytopathological Society, at the same time and place. On the trip to Cleveland, a stop-over was made, on December 30, at Buffalo, N. Y., to visit the botanic garden there.

The Library

The rapid growth of our collections of plants and the increase in our scientific staff make the need of greater library facilities increasingly urgent. In the Garden RECORD for October, 1912, a statement was made of some of the more important publications needed, together with a plan by which the expense of obtaining them might be met. In response to this statement, a gift of one thousand dollars was received from Mr. Alfred T. White, most of which has been expended, and correspondence is now in progress with reference to a probable further gift of five hundred dollars from other friends of the Garden. The statement in the first annual report may be repeated here, that,

FIG. 8. Area east of Mt. Prospect reservoir, assigned to the Institute for Botanic Garden purposes. October 17, 1912.

as soon as we come into possession of our own building, a sum of from $5,000 to $10,000 will be urgently needed for the library.

The librarian reports that during the year 285 bound and over 1270 unbound volumes and pamphlets have been received by gift, purchase, and exchange. Thirty-two (32) periodicals are now being regularly received by subscription, gift, and exchange.

The Herbarium

While it is the present intention of the Garden to lay special emphasis upon other phases of botanical science than taxonomy, nevertheless, it is a self-evident fact that large collections of living plants cannot be properly installed and administered independently of a herbarium. Such a herbarium must be developed with primary reference to the various exhibits of living plants and the botanical investigations and teaching undertaken at the Garden, and will therefore include specimens of plants cultivated at the Garden, as well as of those growing locally and elsewhere without cultivation.

While no special effort has yet been put forth on the herbarium, it may be noted that several hundred specimens have been collected within the borders of the Garden, and one thousand specimens have been presented by Dr. E. W. Olive. In addition to this, two thousand nine hundred (2,900) specimens of parasitic fungi have been acquired by purchase, making a total of over four thousand (4,000) additions to the herbarium during 1912.

Investigations

In the first annual report of the director, emphasis was laid on the value and the necessity of research work in an institution like the Garden. By the terms of our agreement with the City of New York, the Garden is organized for both the advancement and the diffusion of botanical knowledge, and this double nature of our aims and interests must be continuously kept in view. If the members of our staff were not engaged in research, they would become mere handers-on of second-hand knowledge, and all of our instruction would lack that vitality, and enthusiasm, and note of authority, which should be its most marked characteristic.

The fact that we have been in temporary quarters since the Garden started, and have, consequently, had only very limited library facilities, and practically no laboratory accommodations, has made it extremely difficult to engage in any research. Nevertheless, this phase of our work has not been neglected. The curator of plants has made a phytogeographical study of the pine-barren region of New Jersey, the results of which were embodied in our Contribution No. 4; and he has also continued his extensive study of the local flora, covering the region within a radius of 100 miles of the Garden. As during the preceding year, this study has served to enrich the collection in our local flora section. It is anticipated that the final results of the work will be ready for publication during 1913.

The curator of public instruction has continued his studies of plant rusts, and has prepared for printing a paper on the commingling of perennial sporophytic and gametophytic mycelia of species of *Puccinia*. A brief study of ingrowing sprouts of the potato tuber, by the director, appeared as No. 5 of the Garden Contributions.

Mr. C. B. Case, a graduate student of Columbia University, continued until October, as registered investigator, studying problems in connection with the life history and breeding of rice.

Mr. George C. Wood, of the department of biology of the Boys' High School, Brooklyn, has also been given space in the nursery to carry on pedigreed cultures of plants in connection with breeding experiments in which he is engaged.

It is hoped that the near future may see the establishment of several fellowships for research, yielding an annual income of from $500 to $600 each. These fellowships might well take the form of an endowment of as many private research rooms. Young men receiving appointments to such fellowships would be expected to give a portion of their time as assistants in various phases of the Garden work, and this, together with the mere fact of the residence of several advanced students, actively engaged in research, would be a decided advantage to the Garden in many ways.

Public Lectures and Addresses

Public lectures and addresses have been delivered by members of staff as follows:

By the director of the Garden:

March 30. The plants and people of western Cuba. At the Central Museum.

April 23. Why we have Arbor Day. Before the American Association for the Planting and Preservation of City Trees. At the Central Museum.

April 29. The value of trees in our lives. At the Girls' High School Annex, Public School 42, Brooklyn.

May 13. The plant life of Cuba. Before the Biological Association of Erasmus Hall High School, Brooklyn.

June 15. Four weeks in western Cuba. At the New York Botanical Garden.

By the curator of plants:

February 24. Poisonous plants of our woodlands. At the Central Museum.

April 11. Summer gardens. Before the Colony Club, New York.

June 22. Poisonous plants of our woodlands. At the New York Botanical Garden.

December 21. Effects of geology on our local flora. A conference conducted in the Science Room for the Department of Botany of the Institute.

Field Meetings

One field meeting was conducted for the Department of Botany by the director of the garden, on September 28, at the Garden.

Publications of Members of Staff during 1912

Gager, C. Stuart. Wheat rust and sun spots. Science N. S. **35**:74-75. 12 Ja 1912.

———Ingrowing sprouts of *Solanum tuberosum*. Abstract of a paper read before the Bot. Soc. of America, Washington, 29 Dec. 1911. *Science* N. S. **35**:159-160. 26 Ja 1912.

———Report of a trip to western Cuba in the fall of 1910. Brooklyn Bot. Gard. RECORD **1**:1-7. Ja 1912.

———Bigelow's Applied Biology. (Review.) Plant World **15**:67-70. Mr 1912.

———The Brooklyn Botanic Garden. Pop. Sci. Mo. **80**:338-345. Ap 1912.

———First annual report of the Brooklyn Botanic Garden, 1911. Report of the director for July 1, 1910, to December 31, 1911. Brooklyn Bot. Gard. RECORD **1**:25-47. Ap 1912.

———Progress of the Brooklyn Botanic Garden. Bull. Brooklyn Inst. Arts Sci. **8**:406-408. My 1912.

———Payne's Manual of Experimental Botany (Review). Torreya **12**:133-135. Je 1912.

———Phipps Hall of Botany, Pittsburgh. Brooklyn Bot. Gard. RECORD **1**:67-70. Jl 1912.

———Conference on outside co-operation with public schools. *Ibid.* **1**:70-72. Jl 1912.

———The needs of the library. *Ibid.* **1**:91-94. O 1912.

———The Garden bookplate. *Ibid.* **1**:95-96. O 1912.

———The first botanic garden on Long Island. *Ibid.* **1**:97-99. O 1912.

———The economic garden. *Ibid.* **1**:101-102. O 1912.

———Ingrowing sprouts of *Solanum tuberosum*.. Bot. Gaz. **54**:515-524. D 1912. Re-issued as Brooklyn Bot. Gard. Contrib. No. 5.

———(Editor) Brooklyn Bot. Gard. Record **1**:1-116. 1912.

Taylor, N. New England trees in winter. Blakeslee, A. F. and Jarvis, C. D. (Review). Torreya **12**: 36-38. F 1912.

———Our native shrubs and what may be done with them. Garden Mag. **15**:166-168. Ap 1912.

———Report of the curator of plants. Brooklyn Bot. Gard. Record **1**:48-60. Ap 1912.

———Some modern trends in ecology. Torreya **12**:110-117. My 1912.

———Some perennials for the shady nook. Garden Mag. **15**: 308-310. Je 1912.

———Effect of the past winter on shrubs and trees. Brooklyn Bot. Gard. Record **1**:72-76. Jl 1912.

———Recent additions to the local flora garden. Brooklyn Bot. Gard. Record **1**:103-105. O 1912.

———On the origin and present distribution of the pine barrens of New Jersey. Torreya **12**:229-242. O 1912. Reissued as Brooklyn Bot. Gard. Contrib. No. 4.

———Thompson's Sub-alpine plants (Review). The Nation **95**:571-572. 12 D 1912.

Olive, E. W. Perennial gametophytic and sporophytic generations in *Puccinia obtegens* (Lk) Tul. (Abstract). Science N. S. **35**: 150. 26 Ja 1912.

Caparn, H. A. Central Park, New York. A work of art. Landscape Arch. **2**:167-176. Jl 1912.

———A last word on the Lenox Library. Arch. Record **32**:580. D 1912.

———Trees and shrubs as architectural materials. Arch. Record **32**:583. D 1912.

Publications of the Brooklyn Botanic Garden

During 1912 there have been published numbers 4 and 5 of volume I of the *Contributions;* volume I, numbers 1-4 of the RECORD (issued quarterly); and number 1 of the Guides.

Tree Planting by Professor de Vries

It is the intention of the Garden to have, from time to time, as occasion or opportunity arises, commemorative trees planted by distinguished botanists and benefactors of the Garden. The Garden was most fortunate in being able to inaugurate this custom by the planting of a tree (*Liquidambar stryaciflua*) by Hugo de Vries, professor of botany in the University of Amsterdam, and author of the mutation theory. The formal exercises were held at 4:30 p. m., September 12. Cards of invitation were sent to all members of the department of botany of the Institute, to teachers in the local schools, and to many others. The weather was ideal, and there was a large attendance, including trustees of the Brooklyn Institute, and representatives from other scientific institutions in and near Greater New York.

Department of Public Instruction

The work of the department of public instruction was inaugurated with the appointment of Dr. E. W. Olive as the first curator of this department. His report for the period from September 1 to December 31 is appended hereto. As recorded there and elsewhere, Dr. Olive has visited several other institu-

tions in the interests of this department, and on October 19 a conference was held with teachers of biology in local high schools, for the purpose of discussing with them the ways and means in which the Garden may become most useful in connection with their work. As Dr. Olive reports, this conference brought many helpful and stimulating suggestions. A tentative outline of proposed educational activities to be inaugurated by the Garden, and which formed the basis of discussion at that meeting, is given in Dr. Olive's report (pp. 60-66).

Attention may also be called here to the organization of a botanical seminar, composed of members of our own staff and teachers of biology in Brooklyn high schools. This seminar meets bi-weekly, on Monday afternoons, at 4 p. m.

The curator also reports an increasingly large number of visitors to the Garden during the past fall, the most gratifying feature of which is the large percentage of teachers with classes from both grammar and high schools.

Financial Matters

Municipal Funds: I append hereto a financial statement for the fiscal year 1912. It will be seen by an inspection of this statement that the city appropriation was barely sufficient to meet the needs of the Garden. It should not be lost sight of that the appropriation of practically $5,000 for wages enabled us (*cf.* p. 29) to save the city nearly $40,000 on the estimated cost of building the brook, improving the soil, and grading the southern portion of the central meadow. The decrease of $1,000 in this item of the budget for 1913 was in reality not in the line of economy, as it will make it impossible for us to do as well as this during the coming year, especially since we shall have about three acres more of lawn to care for than in 1912. The total amount appropriated by the city in the tax budget for general maintenance, including salaries, wages, and supplies, for 1913, is $29,460.00.

Private funds: The annual income from the endowment fund of $50,000 ($2,625), plus the gift of $1,000 already mentioned (p. 34), makes the total income on private account $3,625. During the past two and one-half years the income from the endowment has been applied chiefly to the more purely educative features of the Garden's work, and to meet certain expenses

which we incur by virtue of being a scientific institution instead of merely a public park, such as the purchase of books and lantern slides, and the issue of purely scientific publications, and including, of course, the purchase of all plants, as per our agreement of December 28, 1909, with the City of New York.

In general, expenditures are assigned in such a way that Institute property and City property can always be readily separable without involving injury to either. Thus, for example, herbarium specimens are not glued to paper bought with City money, and books bought with private funds are also bound at private expense.

Recommendations

Staff: For the past two years the duties of the secretary and librarian have been discharged by one person, but both phases of this work have now increased to such an extent that it has become physically impossible for one person to care for both. The amount of office work alone makes imperative the appointment of an assistant. This appointee would also be able to render some assistance in the library. As soon as we enter our new building next fall, the installation and care of the library and closely related work, will demand the entire time of a trained librarian, preferably a person combining with library training and experience, some knowledge of botany.

By the fall of 1913, the growth of our collections, the work of planning for further development, the administration of the laboratories, and other curatorial duties will make urgent the appointment of another curator.

Our equipment in the line of instruction building and plant houses will also make it possible for us to begin the important work, which has been planned from the establishment of the Garden, with school children. The work can doubtless be done most successfully by a woman teacher, who not only has botanical training, but who is also enthusiastically interested in teaching children. This instructorship is, in reality, one of the most important staff positions now to be filled.

I therefore beg to recommend the appointment of a librarian, of a curator, and of an instructor, all to become effective on

September 1, 1913; and also the appointment of an office assistant, and a laboratory assistant, to enter upon their duties as soon as feasible after we enter into our new building.

Courses of study: Paragraphs four, thirteen, and sixteen of our agreement with New York City specify that the Garden equipment shall be used "for the giving of instruction in botany to the residents of the City of New York," and "for the purpose of general enlightenment." Through inquiries that have come to the Garden, and in several other ways, it seems clearly apparent that a course of study including the elements of botany and the care of plants in conservatories and gardens would be greatly appreciated by a considerable number of young men resident in Brooklyn and vicinity, enabling them to fit themselves to fill acceptably positions in botanic gardens and elsewhere, and for which there seem to be now no opportunities for training within the greater city. The giving of such a course as this would also be of great value to the Garden from both a professional and practical standpoint. I believe we should plan such a course, with a view to offering it at the earliest possible date. There should be a certain minimum of requirement for entrance upon the course, both as to age and to education, and the number of students whom we could accommodate would also be limited.

Acknowledgments

Again we have been placed under great obligations to the administration of the Central Museum for increased office room and innumerable attendant courtesies during the year. Our thanks are especially due to Mr. E. L. Morris, acting curator-in-chief of the Museum, for herbarium and other facilities freely offered, and to Miss Susan Hutchinson, librarian, not only for library assistance and advice, but also for placing one of the library rooms at our disposal from time to time for Garden conferences and other meetings.

We are indebted to Mr. George V. Nash, of the staff of the New York Botanical Garden, for valuable assistance in naming the Palmer collection of evergreens, and to Dr. John Hendley Barnhart, librarian of the same institution, for bibliographical and other advice on library matters.

Mr. John McCallum, Sr., has continued to collect for us during the year living plants of the local flora, and during the fall the Commissioner of Parks of Brooklyn has generously given us over 150 loads of leaves, for the making of leaf-mould. We have also to thank the arboriculturist of Prospect Park, Mr. J. J. Levison, for several specimens of diseased tree trunks and branches, for use as illustrative material in public lectures.

Reference has already been made (p. 36) to the gift of one thousand herbarium specimens by Dr. Olive.

The gift of Mr. P. F. Schofield of several books and periodicals for our library is acknowledged in the report of the secretary and librarian (p. 69), and also the very generous gift of one thousand dollars by Mr. Alfred T. White, for the purchase of books. The books purchased with this latter gift were sorely needed, and have greatly facilitated our work in many ways.

Grateful acknowledgment is also here made of the following gifts: From Mr. Henry Hicks, 19 trees on May 23, and 1 *Liquidambar stryaciflua,* on September 11; from Mrs. Clayton A. Peters, several plants on May 16; from Miss Marie A. du Puget, living plants of *Pixidanthera barbulata* on May 23; from Miss E. M. Kittredge, 68 living plants, representing 34 species, varieties and hybrids of *Viola,* on June 4; from Mr. W. A. White, one copy of Catesby's *Hortus Britanno-Americanus.*

The Garden especially appreciates the gift of a life size bronze bas relief of Dr. John Torrey, and of the annual assay medal, struck by the mint of the United States, at Philadelphia, in Dr. Torrey's honor, in 1874, the year following his death. The medal, mounted in a case of leather and velvet, is accompanied by the letter of transmissal from James Pollock, superintendent of the mint, to Miss Margaret Torrey, Dr. Torrey's daughter. The Garden is indebted for these valued mementoes to Dr. Torrey's son, Mr. Herbert Gray Torrey, and his wife.

Accompanying Papers

The annual reports of the curator of plants, the curator of public instruction, and the secretary and librarian, and a finan-

cial statement are submitted as a part of this report. The amended agreement of September 9, 1912, between the City of New York and The Brooklyn Institute of Arts and Sciences touching the Garden, and calendars of municipal legislation on various Garden matters during 1912 are also appended.

Respectfully submitted,

C. Stuart Gager,

Director of the Garden.

REPORT OF THE CURATOR OF PLANTS FOR 1912

DR. C. STUART GAGER, Director.

Sir:—I have the honor to submit herewith my report as Curator of Plants for the year ending December 31, 1912.

In accordance with the suggestion in my annual report for 1911, the Garden forces have been separated into two divisions, one of gardening proper, the other to do all other general work on the grounds. Both of these forces have been under my supervision and it will be convenient to consider them separately in this report.

1. GENERAL MAINTENANCE AND CONSTRUCTION FORCE

This work has been carried out under the foreman, Mr. Herman Kolsh, with a force averaging 12 men during 28 weeks at the beginning and end of the season, and a force averaging 24 men during the seven busiest weeks in April and May.

The most important work done by this force was the grading of the southern portion of the central meadow, comprising an area of 5 1/5 acres, and the construction of the artificial brook. In order not to delay the fulfilment of the soil improvement scheme* it was necessary to carry on both these operations practically at the same time. Expenses in connection with the grading and building of the brook and the soil improvement scheme were, however, kept separate.

The area occupied by the brook and its adjacent territory was originally quite flat, with a gentle slope southward. The problem was the excavation of the brook and the utilization of the excavated material to give the necessary pitch from the edges of the meadow towards the brook. Plans were drawn up by Olmsted Brothers for this, and the preliminary staking out of the work was accomplished by the engineer, Mr. Thatcher T. P. Luquer, early in April. Work was begun on April 7 and completed on May 27.

*See Brooklyn Bot. Gard. RECORD 1:53. 1912.

FIG. 9. Shaded path along the border mound, west of the local flora valley. May 9, 1912.

The method of procedure was to strip the top soil, partially improved in so far as the soil improvement scheme was completed, and then raise or lower the grade as the need might be, afterwards replacing the top soil in order to have it ready for the completion of the soil improvement scheme, which followed directly the cutting and grading operations. In this way more than 4,500 cubic yards of subsoil were moved with a minimum of expense and a maximum of economic utilization of excavated material. Throughout the job we were digging the brook and making necessary changes in grade practically at the same time. Considerably more material was taken from the brook than was needed for raising the grade in the meadow and this surplus material was used as fill near the building.

Nearly all of the bed of the brook is lined with clay, to prevent seepage into the surrounding area, but some parts of it were practically tight from the start. Several drainage and water pipes were crossed along the brook course, needing adjustment, and these necessary changes have been made, with an indication of such changes on the irrigation map of the Garden. In one or two cases the brook leaked into adjacent drainage pipes, but all such evils have been corrected, we hope permanently, by completely encasing the pipes in concrete jackets, and by other methods.

There are 19 changes of water-level in the brook, marked by dams or rapids. These have been made with glacial boulders, secured through the courtesy of Castle Brothers from an excavation for a street they were constructing near the Garden. Most of these stones, several hundred in number, were hauled and placed by our own force. Nine large boulders, too heavy to handle with our own equipment, were hauled and placed by Harden Brothers, contractors. The construction of these dams was difficult in that an appearance of artificiality must, if possible, be avoided. The Garden received much help in this work from Mr. Frederick Law Olmsted and Mr. Harold A. Caparn. On May 12, I went to Brookline to study with Mr. Olmsted some natural and artificial dams in the public parks there and in the Blue Hills reservation. Many changes in the details of both dams and rapids will undoubtedly be found desirable from time

to time hereafter, and provision has been made for these changes in the method of construction of the dams.

The successful completion of this work by our own force has demonstrated the practicability of the Garden undertaking work of this character for two reasons. In the first place, by this method we secured the area under development in a very much shorter time than is possible by contract work, thus throwing open for botanical exhibition purposes the tract of 5 1/5 acres at once. In the second place, the estimated cost of the construction of the brook by contract was $5,000. No estimate was furnished for grading the area, but taking the price submitted by contractors of 45 cents per cubic yard for material handled on the grounds, it would be about $1,825. In other words, the grading and building of the brook was estimated to cost, by contract, about $6,825. Carefully kept records of the expense involved in this work show that it cost the Garden $2,423.61 up to October 1st. Perhaps $500.00 should be added for work still to be done on the upper end of the brook, on land not yet available for work, and for minor repairs in 1913, but even with these additions there has been a total saving of $3,902.00 on the estimated contract cost of the brook and the grading.

Other minor grading operations were carried on, notably along the Flatbush Avenue path, when one half of Section III had to be taken up and stored in the nursery until the desired grade is reached, probably in the fall of 1913.

Along the line of the reservoir there was more grading done by our own forces to prepare the way for the moving of the iron fence, by The J. L. Mott Iron Works, from our old boundary line to the present one. This completes the record of grading work.

Completion of the Soil Improvement Scheme

The final stages of the soil improvement scheme, outlined in my report of last year,* have been carried out successfully and a permanent lawn is now established on the area. Operations for 1912 cost $985.89, which, added to the 1911 expense account for the preliminary work, makes the total expense for this work

*Brooklyn Bot. Gard. Record 1:53. 1912.

$2,285.89. The following itemized account of the 1912 operations shows an interesting relation between labor and materials in doing work of this kind. The abnormally high cost of weeding is undoubtedly attributable to the large amount of horse manure used during 1911.

Expenses of the Soil Improvement Operations During 1912

Spreading lime and fertilizer and sowing grass seed	$ 27.24
Plowing twice	51.00
Cutting grass	24.00
Harrowing and disc harrowing	20.75
Rolling	8.25
Raking and preparing soil	301.00
Weeding	297.50
Lime	9.00
Fertilizer	128.59
Grass seed	118.56
	$985.89

The high cost of raking and preparing soil is due to a protracted drought at the time, making the ground hard and lumpy, and consequently very difficult to pulverize. The total estimated cost of getting a permanent lawn by the top-soil method was about $40,100. The total saving to the Garden by following the methods adopted here has been ($40,100—$2,285.89) $37,814.11.

Besides the work outlined above, our laboring force has carried on numerous other operations, such as mowing of lawns, hauling and stacking top-soil and manure, cleaning and weeding paths and steps, painting, and whatever other general work has come up. In addition to this they have dug about 450 holes varying from 3 to 8 feet in diameter and 3 feet deep, for the gardeners. These were filled with a mixture of leaf-mould, manure, and rich soil in varying proportions, depending on what was to be planted in them.

To the gardening force there has been transferred one man from the laboring force for 229 working days. Counting the number of days in which the gardening force was working, this means that the laboring force loaned the gardening force one man each day, on an average.

2. GARDENING FORCE

The work of this department has been done under the head gardener, Mr. J. V. Borin, with the assistance of two gardeners and one laborer. The articulation of this with the laboring force is necessarily very close, as much preparatory work for the gardeners must be done by the laboring force. It is a pleasure to report that the system inaugurated this year of having these forces under separate foremen and at the same time maintaining a high degree of interchangeability between them, has proved sufficiently successful to warrant its continuance.

The only new collection to be installed was the coniferous trees and shrubs. The different genera have been grouped around the lake according to a scheme developed by the consulting landscape architect and myself. There are now in the collection representatives of 18 genera and 132 species and varieties. In *Pinus, Picea, Juniperus, Abies,* and *Chamaecyparis* there are 17 species or more represented. In most cases we have two plants for each species in the collection, thus guarding against possible loss. Some genera, such as *Torreya, Cephalotaxus, Fitzroya, Cunninghamia,* and *Libocedrus,* are being tried as to hardiness. It is expected that some of these may prove hardy and thus increase the number of coniferous plants cultivable near New York. Many more will be added from time to time as we can get the plants, and this should prove one of the most attractive collections in the Garden in years to come.

Large additions have been made to the local flora section, but many more species are needed to make this a representative collection of native plants. The largest acquisitions have come from Mrs. C. S. Phelps, at Salisbury, Conn., an account of which appeared in the RECORD for October, 1912. Many pine-barren species have been received from New Jersey, and Mr. John McCallum has continued his generous contributions of Long Island and Staten Island plants. Thirty-four species, varieties, and hybrids of *Viola* were given by Miss E. M. Kittredge, represented by about two plants each. This collection is a valuable acquisition to the local flora garden.

It is becoming increasingly difficult to collect plants new to this collection, and we shall probably have to go further afield in 1913 to get desirable additions.

FIG. 10. Shrub planting on the eastern slope of the local flora valley. July 25, 1912. Cf. FIG. 11.

FIG. 11. Local flora valley, Aug. 14, 1911 Cf. Fig. 10.

The artificial bog was successfully operated this year, and the success is probably due to the fact that material transported in barrels from a pine-barren bog in New Jersey was used to fill it. Leaks were also practically stopped by lining the concrete basin with blue clay.

The success of the shaded walk, with specially prepared soil, mentioned in my last report, has proved the desirability of continuing and, if possible, enlarging this feature, as by it we were enabled to cultivate many American woodland species, not possible of cultivation in the open. Genera successfully cultivated during 1912 include, *Gaultheria, Trillium, Dalibarda, Coptis, Sanguinaria, Caulophyllum, Mitella, Tiarella, Epipactis, Actaea, Chiogenes, Pyrola,* and *Cypripedium.* The trailing arbutus failed to establish itself. Without these highly specialized conditions it would be impossible to grow most of the plants mentioned above.

The economic garden was maintained as during 1911, the proposed change of grade making it unwise to remodel it into its permanent form. The morphological section (Section III) was added to and revised, and the contents of the first 18 beds were removed to the nursery to make way for grading operations. This collection will probably not be intact until some time in the summer of 1913.

It is in the nursery that the greatest growth has been evidenced. Besides a gift from Isaac Hicks & Son, in the early spring, of several evergreens and deciduous trees and shrubs, the Garden has received 644 species of woody plants, nearly all of which have been placed temporarily in the nursery. These are represented by from two to four plants of each species.

From the Arnold Arboretum the Garden secured 514 species of shrubs, trees and vines, all purchased, represented by one or sometimes two or three specimens of each kind. More than 375 of the species secured were collected by Mr. E. H. Wilson during four trips to western China, and it is these Chinese plants that add so much to the botanical value of the collection. The rest of the 514 species are, in part, rare and otherwise interesting plants, many of them also from China, and collected by Mr. W. Purdon, the remainder being of general botanical and horti-

FIG. 12. Preparation for willow planting; terminal pool of the Brook, October 17, 1912. Facing east.

cultural interest. An account of this collection will appear in the RECORD for January, 1913.

During the fall the Garden also secured from Rochester about 130 species of shrubs and trees new to our collections. This was arranged as an exchange between the Board of Park Commissioners of Rochester and the Garden, and our obligation to that board is very great. The collection is a very representative one botanically, including 13 species of willows. These two collections, from Rochester and the Arnold Arboretum, are very important to the Garden, and will serve as the basis of the general systematic series.

Besides the planting of all this material, the gardeners have taken care of the collections already in place and such other general horticultural operations as have come up. Twenty species of hardy water-lilies were put in the lake in the spring, and nearly 45 species of willows were planted along the line of the brook, according to plans outlined by Mr. Caparn and myself. Several hundred herbaceous plants have been raised from seed for the general systematic collections to be installed next year.

Tentative Plans for General Systematic Collections

On August 10 I attended a conference with yourself and Messrs. Olmsted and Caparn in relation to the permanent planting scheme of the general systematic collections. Immediately afterward I submitted, as a working basis, an outline for herbaceous plants that we wish to cultivate in the Garden, including data as to number of species, families, and orders, and an estimate of the space needed for each. A similar estimate was prepared for the woody plants, and both of these are now under consideration by Mr. Caparn with a view to making up a permanent planting plan. As soon as this plan is perfected it will be possible to make such beds as we have plants for, and plant all of the woody plants for which we can properly prepare the ground.

I regret to report the death of two large palms and two large screw-pines, which were killed by the frost owing to the non-completion of the greenhouses.

The temporary service yard has been screened in by about 48 large shrubs, all of which were moved from the site of the greenhouses.

Labelling and other Clerical Work

During most of the summer and thereafter I have had the assistance of Mr. Cullen Adlerblum, who, until his formal appointment on September 1, aided in the work of this department very satisfactorily and without compensation. The following table indicates the number of species added to the collections during the year:

By purchase	1034
By exchange	363
By gift	246
By collection	95
By transfer	1
Total for 1913	1739
Previously accessioned	773
Grand total	2512

Accession numbers 774-2512 were assigned during the year. All of the species added have been furnished with a record service label for convenience in cataloging.

Very few show-labels have been added, the method of relying on outside contract work proving most unsatisfactory. Now that we have a larger tool-house, and a man who knows something of work of this character, it is hoped that a large number of show-labels may be made during 1913.

There have been added to the herbarium about 4,000 specimens, three hundred of which were collected from the cultivated collections.

Personal Activities

During the year I have visited Boston and the Arnold Arboretum on June 3-10, and on October 23-25; on May 12 I went to Brookline, Mass., and during the second week in July I went with you to Ottawa and Montreal to arrange for an exchange of plants and seeds and to inspect the Central Experimental

Farm at Ottawa. On October 21-22, I was in Rochester arranging an exchange of plants with the Board of Park Commissioners, through their representatives, Mr. C. C. Laney, Superintendent of Parks, and Mr. John Dunbar, Assistant Superintendent. Several one-day trips have been made, notably to Hammonton, N. J., on April 7, and in August to nurseries at Arlington, N. J.

In addition to my curatorial duties outlined above I have answered many inquiries by letter, and determined many specimens for members of the Department of Botany of the Institute, upon the executive committee of which I have also served. On the evening of December 21 I conducted a conference in the Science Room on "The effects of geology on our local flora." Twelve lectures have been delivered, one at the Museum, one at the Academy of Music, one at the New York Botanical Garden, one at the Colony Club, New York, and the others for the evening lecture system of the Board of Education of the City of New York.

I have also edited the botanical monthly *Torreya,* and continued my studies on the flora of the vicinity of New York, now well along towards publication. For Prof. C. H. Snow of New York University, I have revised the botanical portions of a book on timber trees for engineers.

During my vacation and in other free time, I have revised or rewritten more than 300 articles in the forthcoming new edition of Bailey's Cyclopedia of Horticulture, and written reviews of botanical books for the *Nation* and the *Evening Post.* I have also written two popular articles for the *Garden Magazine.*

Recommendations

During 1913 the lack of an adequate water supply will be more seriously felt than ever before because of the installation of the general systematic collections. I think, as suggested in my preceding report, that some provision should be made during the coming year materially to increase the water supply.

In the autumn of 1913 it would be desirable to secure from the Arnold Arboretum such other material of the Wilson collection from China as we can. Much was left behind on account

of our lack of greenhouse facilities and the smallness of the stock, but much of this collection is very valuable, and would add greatly to the variety and value of the Garden's collections.

In conclusion, I wish to thank you again for your co-operation in connection with my studies on the local flora.

Respectfully submitted,

NORMAN TAYLOR,
Curator of Plants.

REPORT OF THE CURATOR OF PUBLIC INSTRUCTION FOR 1912

DR. C. STUART GAGER, Director.

Sir:—I beg to submit herewith my report as Curator of Public Instruction for the four months from September 1, 1912, when my appointment took effect, to December 31, 1912.

On August 31 and September 9, en route from the west, I made an inspection of two botanical institutions, the Missouri Botanical Garden, at St. Louis, and the Phipps Conservatories and Hall of Botany, at Pittsburgh. These visits, made at the suggestion of the director, have helped materially toward a proper understanding of the duties and possible lines of activities of botanic gardens in their relation to the public. My formal report on this trip will be found in the Brooklyn Botanic Garden RECORD for January, 1913, pp. 12-14.

On my arrival in Brooklyn, the authorities of the Central Museum very kindly provided temporary laboratory and office facilities and installed therein some necessary conveniences for microscopic and other work.

During the fall a number of visits were made to the Children's Museum of the Brooklyn Institute of Arts and Sciences in order to observe their methods of correlation with schools, and to attend some of their popular lectures to school children. Further observations were made during several visits to the New York Botanical Garden, and recently (December 30, 1912) to the Buffalo Botanic Garden. Such preliminary study of the experience of other institutions in their relation to the public, and in their co-operation and correlation with schools, helps materially toward an adequate orientation of our department of public instruction on these important problems.

After considerable study on the matter, and consultations with the director, a tentative outline of the educational activities planned for the Garden was prepared. In order to secure further advice and help along these lines, a conference of all high school teachers of biology in Brooklyn and Queens, whose names and

addresses could be obtained, was called for October 19, 1912. This meeting will be reported in some detail in the Garden RECORD for January, 1913. Copies of the proposed educational program were submitted to each of the teachers present at the conference, and in the discussion that followed, some very stimulating and helpful suggestions were made, which will undoubtedly aid much in furthering this work.

I present herewith, somewhat modified and amplified by these suggestions, this preliminary outline. Asterisks indicate those activities already begun.

Tentative Outline of Educational Activities of the Brooklyn Botanic Garden

1. Labelled collections of living plants.
   - *a. Plantations.
   - b. Conservatories.
2. Correlation with local school work.
   - *a. Use of the garden, laboratories, and conservatories by high school teachers with their classes.
   - *b. Lectures on nature study and botanical subjects to grammar school children.
   - c. Practical gardening, with talks about the plants grown by the school children. School gardens.
   - d. Voluntary use of microscopes by school children.
   - e. Supply of study material to schools. (See also Supply Department.)
   - f. Prizes to high school pupils for work in botany.
     - (1) For the best standing in the high school course.
     - (2) For the best botanical essay based on a study of the Garden collections, either in the conservatories or out of doors.
     - (3) For the best laboratory study on an assigned topic, done in the Garden laboratory.
3. *Public lectures to adults on various phases of botany by members of the Garden staff and others.
4. Special lectures on request.
   - a. At the Garden.
   - *b. At schools, clubs, etc.

5. Lecture courses.
    *a. For teachers.
    b. For others.
6. Courses of instruction (lectures and laboratory).
    a. In pure science.
    b. In applied science.
7. Public demonstrations and exhibitions, with informal talks.
    a. Microscopical.
        Living material and prepared slides, showing plant cells, moving protoplasm, microscopic algae, fungi, cell-division, wood-sections, embryology, etc., etc.
    b. Macroscopical.
        Plant diseases; exotic food plants and fiber plants; medicinal plants; physiological experiments; care of trees and tree injury; plant propagation; ecological subjects, including insectivorous plants; mushroom growing, etc., etc.
8. Docentry.
    *a. Trips through the plantations and conservatories, under guidance of a docent.
        By regular schedule.
        *By special appointment with teachers conducting classes, etc.
    *b. Field trips to the surrounding country, both to the seashore and inland.
9. *The library, open to all for reference.
10. Bureau of information.
    a. Answers to inquiries.
        *In person.
        *By correspondence.
        By printed matter.
    b. Publicity concerning the Garden activities through
        *The Garden RECORD.
        *The local and the scientific press.
        *Bulletins, posted and mailed.

11. Supply department. (See also No. 2, e.)
    a. For gift or sale.
        Living plants and plant parts, including seedlings and germinated seeds.
        Preserved material in alcohol or formalin for laboratory study.
            Free to local schools.
            For sale to private schools and others at nominal price.
    b. For loan.
        Mounted specimens; specimens to illustrate seed dispersal, etc.; microscopic slides; lantern slides; charts; sterilized culture media in Petri dishes and test tubes, to be exposed in school and home, and returned to the Garden on completion of observations.
    c. For exchange.
        Seeds for exchange with other gardens.
12. Advanced study and research.
    *a. Investigations by the staff, and by registered investigators.
    *b. Seminar and Journal Club.
13. *Presentation of papers before scientific societies by members of the Garden staff and registered investigators.
14. Publications.
        Memoirs.
        *Contributions.
        *Record (administrative).
        *Guides.
        Leaflets.
        Seed-lists.

Notwithstanding the fact that we have had only temporary headquarters, it will be seen from the above outline that we have been able already to inaugurate a considerable number of the educational activities of the Garden. The members of the staff are frequently called in consultation, and have answered many questions of a botanical nature, both in person and by letter.

One of the activities already undertaken, and which is receiving the enthusiastic support of a number of teachers and

others, is the seminar and journal club, intended primarily for members of the staff and any others who may be interested in such advanced work. In starting this work, a circular letter was sent out on November 8, 1912, to all the teachers of biology in Brooklyn whose addresses could be ascertained, inviting their co-operation, and asking their opinions concerning four topics which were suggested for such a seminar. The majority of the replies favored the subject, "Heredity and Plant Breeding," and a meeting was sought for December, but it was afterwards found advisable to postpone the serious work of the seminar until after the holidays.

Notwithstanding, further, the obvious newness and incompleteness of the plantations and buildings of the Garden, it has at frequent intervals during the past fall been visited by many classes of both high school and grammar school pupils, accompanied by their teachers. This fact, as well as the enthusiastic anticipation of both teachers and pupils, expressed from time to time, argues for the future usefulness of the Garden. At present quite accessible by reason of its central position in the city, the Garden promises to become even more easily accessible on the further improvement of rapid transit facilities. The visiting classes have studied the plantations already installed, the methods of resoiling in the central meadow, the planting of trees and shrubs along the brook, the large blanket labels giving general information about the various planted sections of the Garden, and the insectivorous and economic plants, as well as other developments of the Garden. Among the classes which have had official guidance during the fall were the senior class of the Yale University Forest School, accompanied by their instructor, Mr. Levison, and about eighty members of the Junior Department of the American Association for the Planting and Preservation of City Trees, accompanied by Miss Carmichael, of the staff of the Children's Museum. That the use of the Garden is not restricted to the growing season is evidenced by the fact that numbers of these classes have come to the Garden to study the trees and other plants in winter condition.

Many lantern slides, for the most part colored by Miss Elsie M. Kittredge, and illustrating largely plants of the local flora,

have been added during the past year to the stock being prepared to illustrate Garden lectures. Of the total number (460) accessioned during the past year, 218 have been colored; and 848 negatives of botanical subjects were accessioned during 1912. Besides these, some illustrative material has been recently presented to the Garden by Mr. Levison, arboriculturist of Prospect Park, consisting of pieces of trees of various species (to be later made up into a part of our loan collection for schools), and portions of diseased trunks. Also added to our material equipment for teaching purposes are the dried plants consisting of over a thousand specimens, presented to the Garden by the curator of public instruction.

The research work carried on by the curator of this department during the past four months has concerned mainly the continuation of the investigations of the past several years having to do with various plant diseases. One paper was recently completed on a phase of the rust problem entitled, "Intermingling of the perennial sporophytic and gametophytic generations in rusts." This paper was prepared primarily for presentation before the scientific meetings held during the recent holidays at Cleveland, and for later publication as a *Contribution* from the Garden. On December 29, in company with the director, I departed for Cleveland to attend the meetings of the American Association for the Advancement of Science and affiliated societies, stopping on the way for a short visit to the Buffalo Botanic Garden.

It is respectfully recommended that, if possible, in the future plantations of the Garden some space be provided for the inauguration of school gardens, to be cultivated by pupils of neighboring schools. Such a development would undoubtedly prove a most stimulating means of arousing more general interest in plants and in their growth and cultivation, as well as of directing the attention of the community, and especially of the school children, to the educational activities attempted by our Garden.

I wish to record here my thanks to Professor Bristol, of New York University, for the loan of a microscope for several months during the fall; as well as to the authorities of the

botanical department of Columbia University, to those of the New York Botanical Garden, and those of the Central Museum, for their courtesies in the matter of library and other facilities furnished me. I also take pleasure in acknowledging my indebtedness to the acting curator-in-chief of the Central Museum, Mr. E. L. Morris, for his kindness in installing facilities for microscopic and other work.

Respectfully submitted,

EDGAR W. OLIVE,

Curator of Public Instruction.

REPORT OF THE SECRETARY AND LIBRARIAN FOR 1912

DR. C. STUART GAGER, Director.

Sir:—I beg to submit herewith a report of the library and office for the year ending December 31, 1912.

The Library

During this year, as in the preceding one, the publications belonging to the Garden have been cared for in the very limited space available for our use in the Museum building. This, and the further fact that the work of the office has of necessity had prior claim upon the time of the secretary and librarian, has prevented the careful classification and shelving of the books which they will receive when we come into possession of our own building. However, a temporary means of recording publications now belonging to the Garden having been found necessary, a card index, giving author and subject of all books and pamphlets, has been made. This was accomplished with the assistance of a trained librarian for eleven and one-half days.

In addition to the temporary record above mentioned, all bound volumes have been permanently accessioned as they have been received, the library book-plate has been affixed to them, and all publications have been stamped with the library embossing stamp.

A card system for recording the receipt of periodicals has been inaugurated, and the files of publications germane to our subject issued by the various divisions of the U. S. Department of Agriculture have been increased by the later issues as they appeared from time to time, and by many numbers heretofore wanting.

During the winter months, Mr. Adlerblum, garden aid, has rendered much assistance in the work of the library.

One of the problems to be met in the inauguration of the library was that of the care of the large number of pamphlets

constantly received. These are often as important and should be as easily accessible at all times as bound volumes, but owing to their unprotected condition, they may be easily destroyed by constant use. A system of caring for these has been adopted. This consists of binding each one separately in a pamphlet binder and treating it as a bound volume. The Gaylord pamphlet binder seemed best to serve our purpose. This is a heavy pressboard binder, faced on the edges with cloth. The pamphlet is securely fastened to it by a folded gummed strip, and when considered necessary, is further strengthened by the use of wire staples, especially designed for the purpose. The design of the library book-plate, printed on the outside cover of the binder, makes it additionally attractive, and insures the ready identification of misplaced pamphlets. Various sizes of binders are provided as required, and different combinations of colors have been chosen for the various classes of publications to be bound in them, as follows: for experiment station publications, tan pressboard with brown binding; for miscellaneous Government publications, tan pressboard with tan binding; for separate reprints, green pressboard with red binding; for other pamphlets, green pressboard with green binding. This work of binding has been commenced this year and will continue from year to year as the library grows.

The shelving facilities have been somewhat increased by the addition of thirty-five "elastic" book units, which have been temporarily pressed into service for library use, but even this additional equipment does not permit the shelving of all books, and many of them, not at present urgently needed in the conduct of the work of the Garden, will remain in storage until the completion of our own building.

As will be seen in the summary on page 70, the growth of the library during these two years of its existence has been quite significant.

We have completed to date the following serial publications: *Rhodora,* which has also been bound; *Bulletin of the Torrey Botanical Club; Journal of Biological Chemistry; The American Botanist; The Ohio Naturalist;* and *Leaflets,* by E. L. Greene.

The publications received by exchange from the New York Botanical Garden early in 1911, and stored during the remainder of that year, have now been cared for. In this accession there were 62 bound volumes, 688 pamphlets, and a large number of parts of serial publications.

We are at present receiving 22 periodicals: 12 by subscription; 7 by exchange; 3 by gift.

The library collections have been further enlarged by many monographs and separate reprints of botanical papers, presented by their authors; also by much descriptive literature and many seed lists received from foreign botanical gardens in reply to the circular letter sent out in 1911 asking for exchange courtesies, and the one of 1912, requesting information regarding the organization, equipment and activities of the various gardens. Many Government and state publications have also been received, which are not included in the summary on page 70.

A gift of one thousand dollars from Mr. Alfred T. White, has been almost entirely expended in the purchase of monographs, manuals, and floras. From Mr. P. F. Schofield were received Downing's *Landscape Gardening and Rural Architecture,* several botanical text-books, and 14 volumes of *American Forestry,* from volume 4, 1898, when it appeared under the title, *The Forester,* to volume 17, 1911; incomplete volumes of a number of popular magazines; various reports on forestry and conservation; and publications from the Bureau of Forestry at Washington, which were of assistance in bringing our files of these publications more nearly up to date. Mrs. Annie Morrill Smith has presented the two volumes of *Science* for 1912; and Mr. W. A. White gave a copy of *"Hortus Britanno Americanus,"* by Mark Catesby.

The set of index cards of agricultural experiment station literature has been increased by the purchase of 147 cards. These remain unfiled, for want of room.

The following summary of publications now possessed by the Garden may be made:

Summary

Total number of bound volumes Dec. 31, 1911		234
Added by purchase during 1912	139	
Added by gift	88	
Added by exchange	58	
Total number added		285
Number of bound volumes Dec. 31, 1912		519
Unbound volumes, by gift, purchase and exchange		120
Pamphlets (not counting files of Government and agricultural experiment station publications), about		1150
Total number of volumes and pamphlets		1789
Current periodicals regularly received:		
By subscription	12	
By exchange	7	
By gift	3	22

The Office

During this year the routine work of the office has proceeded as usual. Manuscripts and letters have been typed, correspondence filed from day to day, requisitions and orders made, also inventory cards covering all purchases, small bills paid from the petty cash account, and larger ones prepared for the treasurer's office, the laborers' payroll paid weekly during the working season, the necessary office accounts kept, and data for the annual budget compiled. Envelopes have been addressed and stamped for mailing four numbers of the Garden Record, about 650 copies each, and 360 copies of *Guide No. 1*, also a considerable number of the Garden series of *Contributions*. A three-page circular letter, requesting data concerning their organization, equipment and activities, has been sent to all botanical gardens of the world whose addresses now appear on our card index, numbering about 450, and one circular letter was sent to the teachers of biology in the schools of Brooklyn.

Respectfully submitted,

Bertha M. Eves,
Secretary and Librarian.

FINANCIAL STATEMENT FOR 1912

1. MUNICIPAL ACCOUNT FOR 1912..... ..			$25,830.57
Code No.			
1086 *Salaries, Regular Employees:*			
Appropriated			$12,173.32
Expended			12,144.35
Balance			28.97
1087 *Wages, Temporary Employees:*			
Appropriated			$ 4,992.00
Contributed from Surplus Fund ....$	14.00		
Contributed from Endowment Income	12.50	26.50	
		$ 5,018.50	
Expended		5,017.66	
Balance		.84	
1088 *Supplies and Materials:*			
Appropriated		5,350.25	
Expended	5,125.00		
Transferred to Contingencies	225.00	5,350.00	
Balance		.25	
1089 *Repairs and Replacements by Contract or by Open Order:*			
Appropriated		1,500.00	
Expended	1,451.00		
Transferred to Vehicular Transportation	48.00	1,499.00	
Balance		1.00	

1090	*Housing, Storage and Repairs of Apparatus, Machines, Harness and Vehicles, except Automobiles:*		
	Appropriated		50.00
	Expended	31.00	
	Transferred to Vehicular Transportation	19.00	50.00
1091	*Vehicular Transportation, with driver:*		
	Appropriated		625.00
	Transferred from Housing, Storage & Repairs, &c...	19.00	
	Telephone	13.00	
	Special Contract Obligations	100.00	
	Repairs & Replacements by Contract or by Open Order	48.00	180.00
	Contributed from Surplus Fund		6.60
			811.60
	Expended		811.60
1092	*Vehicular Transportation, without driver:*		
	Appropriated		90.00
	Expended		83.13
	Balance		6.87

1093	*Telephone Service:*		
	Appropriated		100.00
	Expended	78.80	
	Transferred to Vehicular Transportation	13.00	91.80
	Balance		8.20
1094	*Contingencies (Administration):*		
	Appropriated		550.00
	Transferred from Supplies & Materials	225.00	
	Contributed from Surplus Fund	2.04	227.04
			777.04
	Expended		777.04
1095	*Contingencies (Maintenance):*		
	Appropriated		300.00
	Expended		297.96
	Balance		2.04
1096	*Special Contract Obligations:*		
	Appropriated		100.00
	Expended	0.00	
	Transferred to Vehicular Transportation	100.00	100.00

Summary:		
Total Expended	25,782.40	
Balance, December 31, 1912	48.17	25,830.57

2. Botanic Garden Accounts, for 1912.....$5,522.58

Endowment Fund, Income Account:	
Balance, Jan. 1, 1912.....	1,897.58
Received	2,625.00
	4,522.58
Expended	3,037.06
Balance, Dec. 31, 1912.....	1,485.52
Special Contribution: for the Library:	
Received	1,000.00
Expended in 1912	668.00
Balance Dec. 31, 1912.....	332.00

Summary:		
Total expended in 1912.....	3,705.06	
Balance, December 31, 1912.....	1,817.52	5,522.58

APPENDIX 1

AGREEMENT OF SEPTEMBER 9, 1912, BETWEEN THE CITY OF NEW YORK AND THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES, AMENDING THE AGREEMENT OF DECEMBER 28, 1909, TOUCHING THE BROOKLYN BOTANIC GARDEN*

THIS AGREEMENT, made and concluded on the 9th day of September, in the year nineteen hundred and twelve, between The City of New York, acting by its Board of Estimate and Apportionment, party of the first part, and the Brooklyn Institute of Arts and Sciences, party of the second part, witnesseth:

WHEREAS, The City of New York, acting by its Board of Estimate and Apportionment, party of the first part, and the Brooklyn Institute of Arts and Sciences, acting by its Board of Trustees, party of the second part, entered into an agreement on the 28th day of December, in the year 1909, for the establishment and maintenance of a Botanic Garden and Arboretum on park lands in the Borough of Brooklyn, City of New York, and for the care of the same, in accordance with the terms and conditions as expressed in said agreement, and under authority granted to the said City of New York by chapter 618 of the Laws of 1906; and

WHEREAS, Said chapter 618 of the Laws of 1906 has been amended by chapter 178 of the Laws of 1911, entitled "An Act to amend Chapter 509 of the Laws of 1897, entitled 'An Act to provide for the establishment of a Botanic Garden and Arboretum on Park Lands in the City of Brooklyn, and for the care of the same,'" generally; and

WHEREAS, The Commissioner of the Department of Water Supply, Gas and Electricity having certified to the Commissioners of the Sinking Fund, under date of August 5, 1911, that two parcels of Prospect Heights Reservoir Land hereinafter described are no longer needed for reservoir purposes; and

WHEREAS, The Board of Park Commissioners of The City of New York, on December 14, 1911, recommended to the Commissioners of the Sinking Fund that the same two parcels of land hereinafter described be transferred to the custody of the Department of Parks for use as a Botanic Garden and Arboretum; and

WHEREAS, The Commissioners of the Sinking Fund of The City of New York, on January 10, 1912, transferred the said two parcels of land hereinafter described to the Department of Parks of the Borough of Brooklyn for use as a Botanic Garden and Arboretum through the passing of the following resolution:

RESOLVED, That, pursuant to the provisions of Section 205 of the Greater New York Charter, as amended, the Commissioners of the Sinking Fund hereby assign to the Department of Parks, Borough of Brooklyn,

---

*This Amendment was executed in triplicate, and one copy deposited with the Secretary of the Board of Estimate and Apportionment, one with the Comptroller of the City of New York, and one with the Treasurer of the Brooklyn Institute of Arts and Sciences.

for the establishment of a Botanic Garden and Arboretum, property bounded and described as follows:

First Parcel.

Beginning at the southwesterly corner of old Grand avenue and old Sackett street as formerly laid out on the Commissioner's map of the County of Kings, and continuing in a southerly direction along the west side of said Grand avenue to the northerly side of old President street, as formerly laid out on said map, for a distance of 594 feet, more or less; thence in a westerly direction along the northerly side of said old President street to the easterly side of Flatbush avenue 725 feet, more or less; thence northerly along the easterly side of Flatbush avenue for a distance of 27.94 feet, more or less, to a point where a line parallel to the northerly side of old President street and 20 feet north of said line intersects the easterly side of Flatbush avenue, and thence in an easterly direction along said line parallel to President street, to a point situated 20 feet from the northerly side of old President street and 250 feet west of the westerly side of Grand avenue; and thence in a northerly direction parallel to the westerly side of said old Grand avenue to the southerly side of old Sackett street, a distance of 574 feet; thence in an easterly direction along the southerly line of old Sackett street, a distance of 250 feet, to the westerly side of old Grand avenue at the point of beginning.

Second Parcel.

Beginning at the southwesterly corner of Grand avenue and Sackett street, as formerly laid out on the Commissioner's map of the County of Kings and continuing in a westerly direction along the southerly side of Sackett street 250 feet to a point; thence northerly and parallel to Grand avenue to a point on the southerly side of the Eastern parkway; thence in an easterly direction along the southerly side of the Eastern parkway to its intersection with the westerly side of Grand avenue; thence southerly along the westerly side of Grand avenue 18 feet to the point of beginning.

—said assignment being made under the following conditions:

First—That the iron fence shall be rebuilt by the Park Department or the Botanic Garden along the easterly side of the remaining reservoir property, and if the adjoining lands shall be graded to a lower elevation, a slope of 2 to 1 shall be left with a berm of sufficient width to secure the stability of the fence, and means of access to the reservoir property by vehicles shall be provided to the lower berm on the north side of the reservoir and to the roadway at the south side of the reservoir.

Second—The Department of Water Supply, Gas and Electricity intends to erect an office and tool house approximately 20 feet by 30 feet at a location to be hereafter designated by the Commissioner of said Department, and the right is hereby reserved, therefore, to use any portion of the lands herein designated and described, and to be assigned to the Park Department that the Commissioner of the Department of Water Supply, Gas and Electricity may consider necessary for the erection of said office and tool house.

Third—The lands to be assigned to the Department of Parks shall be reassigned to the Department of Water Supply, Gas and Electricity upon the certification of the Commissioner of Water Supply, Gas and Electricity that said lands are needed for the extension or improvement of the water supply system.

Fourth—No buildings shall be erected by the Department of Parks

on any of the lands hereby assigned without the written consent of the Commissioner of the Department of Water Supply, Gas and Electricity, as set forth in said instrument of designation dated August 5, 1911; and

WHEREAS, The Board of Park Commissioners of The City of New York has on the 27th day of March, 1912, recommended to the said Board of Estimate and Apportionment that the agreement entered into between the party of the first part and the party of the second part under the authority of chapter 618 of the Laws of 1906, said agreement being dated December 28, 1909, be amended as hereinafter set forth and as provided in section 3 of chapter 178 of the Laws of 1911:

NOW, THEREFORE, in consideration of the actions already taken under chapter 618 of the Laws of 1906, chapter 178 of the Laws of 1911, and section 205 of the Greater New York Charter, as amended, and in consideration of the mutual agreements herein contained, it is agreed by and between the said parties that the agreement between the said City of New York and the said Brooklyn Institute of Arts and Sciences, entered into on December 28, 1909, be hereby amended as follows, namely:

First—That the party of the first part has granted and demised, and doth by these presents grant, demise and let unto the said party of the second part the two parcels of land heretofore pertaining to the Prospect Hill Reservoir hereinbefore described and bounded; said two parcels of land to be added to the lands of the Brooklyn Botanic Garden and Arboretum leased to the Brooklyn Institute of Arts and Sciences on December 28, 1909, the said Institute, party of the second part, to have and to hold the same so long as the said party of the second part shall continue to carry out the objects and purposes defined in its Charter, or any amendment of said Charter, except as herein or as in the aforesaid agreement of December 28, 1909, otherwise provided, and shall maintain and administer these two said parcels of land hereinbefore bounded and described for the purposes of a Botanic Garden and Arboretum as provided in chapter 178 of the Laws of 1911; and shall faithfully keep, perform and observe the covenants and conditions herein contained on its part to be kept, performed and observed until said land shall be surrendered by the said party of the second part, or its surrender is required by the party of the first part as provided in the original agreement, dated December 28, 1909, and as further provided in this agreement; and the said two parcels of land shall be used and held by the party of the second part under the same terms and conditions in all respects as the lands leased by the party of the first part to the said party of the second part on December 28, 1909, with the following exceptions and conditions:

1. That the iron fence shall be rebuilt by the Park Department or the Botanic Garden along the easterly side of the remaining reservoir property, and if the adjoining lands shall be graded to a lower elevation, a slope of 2 to 1 shall be left with a berm of sufficient width to secure the stability of the fence, and means of access to the reservoir property by vehicles shall be provided to the lower berm on the north side of the reservoir and to the roadway at the south side of the reservoir.

2. The Department of Water Supply, Gas and Electricity intends to erect an office and tool house approximately 20 feet by 30 feet at a location to be hereinafter designated by the Commissioner of said Department, and the right is hereby reserved, therefore, to use any portion of the lands herein designated and described and to be assigned to the Park Department that the Commissioner of the Department of Water Supply, Gas and Electricity may consider necessary for the erection of said office and tool house.

3. The lands to be assigned to the Department of Parks shall be reassigned to the Department of Water Supply, Gas and Electricity upon the certification of the Commissioner of Water Supply, Gas and Electricity that said lands are needed for the extension or improvement of the water supply system.

4. No buildings shall be erected by the Department of Parks on any of the lands hereby assigned without the written consent of the Commissioner of the Department of Water Supply, Gas and Electricity, as set forth in said instrument of designation dated August 5, 1911.

And the party of the first part herein agrees to provide such sums as the Board of Estimate and Apportionment may deem necessary for the cost of the necessary grading, soil additions, and other permanent improvements and for the annual maintenance of said lands, in the same manner that it provides for other permanent improvements and for maintenance in the Botanic Garden and Arboretum heretofore established through the said agreement dated December 28, 1909, and in pursuance of authority granted by said chapter 178 of the Laws of 1911.

Second—And the party of the second part now holding the sum of $50,000.00, the principal or interest of which is to be expended for the benefit of the said Botanic Garden and Arboretum, is privileged after the date of the execution of this agreement, in pursuance of authority granted in section 2 of said chapter 178 of the Laws of 1911, to use the income thereof for the purchase of plants, flowers and trees, or for other purposes in connection with said Botanic Garden and Arboretum.

And it is hereby expressly agreed that this contract may be cancelled and annulled at any time by the party of the first part, providing the Board of Estimate and Apportionment of the party of the first part, its successor or successors, after notice in writing to the party of the second part, served by mailing or otherwise, notifying the party of the second part that some action is to be taken in reference to this agreement, by a vote of three-fourths of all its members, by motion or resolution decide that it is for the best interests of the party of the first part that said contract be cancelled or annulled. And it is further agreed that upon said Board of Estimate and Apportionment aforesaid directing the cancellation or annullment of said contract, that the party of the first part shall serve upon the party of the second part, or its successor or successors, or any officer thereof, a notice in writing notifying the said party of the second part of the action of the said Board of Estimate and Apportionment, and the said party of the second part shall thereafter, and before the expiration of six months after the date of the service of said notice in writing, as aforesaid, notifying the party of the second part of the cancellation or annullment of the contract by the party of the first part, quit or surrender the said premises and remove all of its property therefrom except as hereinbefore provided, and after such notice said party of the second part shall and will at or before the expiration of six months, quietly and absolutely yield up and surrender to the party of the first part, its successor or successors, all and singular the aforesaid demised premises, and upon the failure of the party of the second part to remove from said premises all its property and surrender and quit said premises as aforesaid, within six months after the service of notice as aforesaid, the said party of the first part shall have the right to enter in and upon said premises and take possession of same, together with all property of every kind, nature and description remaining thereon.

And it is further understood and agreed by and between the parties hereto that this agreement may be wholly cancelled or annulled, or from time to time be modified as may be mutually agreed in writing between said parties, or their successor or successors, anything herein contained to the contrary in anywise notwithstanding.

IN WITNESS WHEREOF the party of the first part has caused this agreement to be executed by its Mayor, pursuant to a resolution of the Board of Estimate and Apportionment adopted at a meeting held on the 11th day of July, in the year of our Lord nineteen hundred and twelve, and the said party of the second part has caused the same to be executed by its President and Treasurer, and its official seal affixed thereto, pursuant to a resolution of the Board of Trustees of the Brooklyn Institute of Arts and Sciences adopted at a meeting held on the 8th day of March, in the year of our Lord nineteen hundred and twelve.

CITY OF NEW YORK,
WILLIAM J. GAYNOR, *Mayor.*
BROOKLYN INSTITUTE OF ARTS AND SCIENCES,
A. AUGUSTUS HEALY, *President.*
[SEAL] CLINTON W. LUDLUM, *Treasurer.*

Approved as to form:
JOHN L. O'BRIEN, *Acting Corporation Counsel*

BOARD OF ESTIMATE AND APPORTIONMENT
CITY OF NEW YORK

Resolved, That, pursuant to the provisions of chapter 618 of the Laws of 1906, as amended by chapter 178 of the Laws of 1911, the Board of Estimate and Apportionment hereby approves of the amended agreement submitted by the Park Board of The City of New York, between The City of New York, acting by the Board of Estimate and Apportionment, and the Brooklyn Institute of Arts and Sciences, relative to the establishment and maintenance of a Botanic Garden and Arboretum on park lands in the Borough of Brooklyn, under the jurisdiction of said Institute of Arts and Sciences, and the Mayor be and is hereby authorized to execute said agreement on behalf of The City of New York.

A true copy of resolution adopted by the Board of Estimate and Apportionment, July 11, 1912.

JOSEPH HAAG,
Secretary.

APPENDIX 2

MUNICIPAL ACTION ON THE AMENDED AGREEMENT OF SEPTEMBER 9, 1912, BETWEEN THE CITY OF NEW YORK AND THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES, AS RECORDED IN THE CITY RECORD

The amended agreement was *approved as to form* by the ACTING CORPORATION COUNSEL (*City Record* **40**:6717. 13 Ag 1912.)

1912
March 7 The PARK BOARD *approved* the terms and conditions of the amended agreement. (*City Record* **40**:6716. 13 Ag 1912.)

March 9 The Agreement was *forwarded* by the PARK BOARD to the Board of Estimate and Apportionment. (*City Record* **40**:6716. 13 Ag 1912.)

March 14 The communication from the secretary of the Park Board, transmitting, for approval, the modified agreement of the Brooklyn Institute of Arts and Sciences, was *referred to the Comptroller* by the BOARD OF ESTIMATE AND APPORTIONMENT. (*City Record* **40**:6716. 13 Ag 1912.)

March 27 The BOARD OF PARK COMMISSIONERS *recommended* to the Board of Estimate and Apportionment that the agreement of Dec. 28, 1909 (Brooklyn Bot. Gard. RECORD **1**:7-16. 1912) be amended. *City Record* **40**:6716. 13 Ag 1912.)

June 25 The Bureau of Municipal Investigation and Statistics, of the Department of Finance, acting by the COMPTROLLER, *recommends* to the Board of Estimate and Apportionment that the Mayor be authorized to execute the agreement as modified. (*City Record* **40**:6717. 13 Ag 1912.)

July 11 The BOARD OF ESTIMATE *approves* the amended agreement, and *authorizes* the Mayor to execute the same on behalf of the City of New York. (*City Record* **40**:6717. 13 Ag 1912.)

Sept. 9 The amended agreement was *executed* by the MAYOR.*

Sept. 21 "A certified copy of executed agreement between the City and the Brooklyn Institute of Arts and Sciences, for the establishment and maintenance of a botanic garden and arboretum on park lands in the Borough of Brookyn, was received [by the PARK BOARD] from the Secretary of the Board of Estimate and Apportionment and *placed on file.*" (*City Record* **40**:7791. 8 O 1912.)

APPENDIX 3

MUNICIPAL ACTION ON APPROPRIATIONS FOR BUILDINGS AS RECORDED IN THE CITY RECORD

ACTION ON THE APPROPRIATION FOR THE SECOND PART OF THE PLANT HOUSES (THE PALM HOUSE).

1912

May 17 The PARK COMMISSIONER *transmitted* to the Board of Estimate and Apportionment, for its approval, the plans, form of contract, specifications (as amended), and the estimate of cost ($33,000), "for all materials and labor required for the erection of the second part of greenhouses." The cost is to be paid from a corporate stock fund entitled "C. D. P.—200 L., Department of Parks, Boroughs of Brooklyn and Queens, Construction and Equipment of a Laboratory Building and Greenhouses in the Botanic Garden and Arboretum." (*City Record* **40**:5541. 27 Je 1912.)

*Note: On August 16, the amended agreement was *executed on behalf of the Brooklyn Institute of Arts and Sciences* by its Treasurer, on September 15, 1912, by its President, pursuant to a resolution of the Board of Trustees of the Institute adopted at a meeting held on March 8, 1912.

June 14 The DEPUTY AND ACTING COMPTROLLER *recommended* to the Board of Estimate and Apportionment the *approval* of the plans, specifications (as amended), and the estimate of cost, as above stated. (*Ibid.*)

June 20 The BOARD OF ESTIMATE AND APPORTIONMENT *approved* the plans, etc., as above. (*Ibid.*)

Oct. 17 *Bids received were opened as follows:* William R. Thompson, $24,878; John R. Sheehan, $25,250; Kelly & Kelly, $26,290; Concord Construction Co., $28,837; Cockerill & Little Co., $31,000.

The Park Commissioner was advised by the CORPORATION COUNSEL'S office, that the contract should not be let inasmuch as the specifications did not conform to legal requirements in omitting the words "or equal thereto," in specifying the type of construction of the greenhouse. On this ground formal protest was made by two builders of greenhouses against letting the contract. The specifications, therefore, have been returned to the architects, to be revised, reprinted, and re-advertised.

APPENDIX 4

MUNICIPAL ACTION ON THE TAX BUDGET FOR 1913

1912
Oct. 31 *Passed* by BOARD OF ESTIMATE AND APPORTIONMENT. (*City Record* **40**:9519. 23 N 1912.)

Nov. 26 *Passed* by the BOARD OF ALDERMEN, as recommended by the Majority Report of the Committee on Finance of the Board. No change was made in the items of the Garden budget, as passed by the Board of Estimate and Apportionment. (*City Record* **40**:9679, 9694. 27 N 1912.)

Dec. 10 A message from the MAYOR contained his approvals and disapprovals of the reductions and amendments of the Board of Aldermen in the budget as passed by the Board of Estimate and Apportionment. The Garden budget stands as originally passed by the Board of Estimate and Apportionment. (*City Record* **40**:10189, 10205. 12 D 1912.)

APPENDIX 5

RESOLUTIONS APPROVING THE ISSUE OF CORPORATE STOCK OF THE CITY OF NEW YORK FOR BOTANIC GARDEN BUILDINGS, GRADING, AND WALKS

1. *Resolved,* That, pursuant to the provisions of chapter 178 of the Laws of 1911, the Board of Estimate and Apportionment hereby approves of the issue of corporate stock of the City of New York, to an amount not exceeding seventeen thousand dollars ($17,000), to provide means for the construction of greenhouses in the Botanic Garden and Arboretum

under the jurisdiction of the Department of Parks, Boroughs of Brooklyn and Queens, and that when authority therefor shall have been obtained from the Board of Aldermen, the Comptroller be and is hereby authorized to issue said corporate stock of The City of New York in the manner provided by section 169 of the Greater New York Charter, the proceeds thereof to the amount of the par value of the stock to be applied to the purposes aforesaid.

2. *Resolved,* That, pursuant to the provisions of chapter 178 of the Laws of 1911, the Board of Estimate and Apportionment hereby approves of the issue of corporate stock of The City of New York to an amount not exceeding thirty-three thousand dollars ($33,000), to provide means for the construction and equipment of an instruction building, in the Botanic Garden and Arboretum, under the jurisdiction of the Department of Parks, Boroughs of Brooklyn and Queens, and that when authority therefor shall have been obtained from the Board of Aldermen, the Comptroller be and is hereby authorized to issue said corporate stock of The City of New York, in the manner provided by section 169 of the Greater New York Charter, the proceeds thereof to the amount of the par value of the stock to be applied to the purposes aforesaid.

3. *Resolved,* That, pursuant to the provisions of chapter 178 of the Laws of 1911, the Board of Estimate and Apportionment hereby approves of the issue of corporate stock of The City of New York to an amount not exceeding forty thousand dollars ($40,000), to provide means for grading, draining, piping, soil improvements and water course in the Botanic Garden and Arboretum, under the jurisdiction of the Department of Parks, Boroughs of Brooklyn and Queens, and that when authority therefor shall have been obtained from the Board of Aldermen, the Comptroller be and is hereby authorized to issue said corporate stock of The City of New York in the manner provided by section 169 of the Greater New York Charter, the proceeds thereof to the amount of the par value of the stock to be applied to the purposes aforesaid.

4. *Resolved,* That, pursuant to the provisions of chapter 178 of the Laws of 1911, the Board of Estimate and Apportionment hereby approves of the issue of corporate stock of The City of New York to an amount not exceeding thirty thousand dollars ($30,000), to provide means for the construction of roadways, walks, stone steps, and paving in the Botanic Garden and Arboretum, under the jurisdiction of the Department of Parks, Boroughs of Brooklyn and Queens, and that when authority therefor shall have been obtained from the Board of Aldermen, the Comptroller be and is hereby authorized to issue said corporate stock of The City of New York, in the manner provided by section 169 of the Greater New York Charter, the proceeds thereof to the amount of the par value of the stock to be applied to the purposes aforesaid.

The above resolutions were adopted at a meeting of the Board of Estimate and Apportionment, held July 17, 1911. (*City Record* **39**:7173. 18 Ag 1911.)

APPENDIX 6

RESOLUTIONS OF THE BOARD OF ESTIMATE AND APPORTIONMENT APPROVING TRANSFERS OF FUNDS TO THE AMOUNT OF $405, APPROPRIATED IN THE TAX BUDGET OF THE BROOKLYN BOTANIC GARDEN FOR 1912

1. *Resolved,* That, pursuant to the provisions of section 237 of the Greater New York Charter, the Board of Estimate and Apportionment hereby approves the transfer of funds appropriated to the Department of Parks, Borough of Brooklyn, for the year 1912, as follows:

Code No.		
	FROM	
1090	Housing, Storage and Repairs of Apparatus, Machines, Harness and Vehicles, except Automobiles	$ 19.00
1093	Telephone Service	13.00
1096	Special Contract Obligations	100.00
1089	Repairs and Replacements by Contract or Open Order	48.00
1088	Supplies and Materials	225.00
	TO	
1091	Vehicular Transportation	$180.00
1094	Contingencies	225.00

2. *Resolved,* That the Board of Estimate and Apportionment hereby approves of the Schedule, as revised, for the Department of Parks, Borough of Brooklyn, for the year 1912, as follows:

Vehicular Transportation, Horses and Vehicles with Drivers

1091	Maintenance—	
	Driver with Horse, at $3 per day (15 days)	$ 45.00
	Driver with Horse and Vehicle, at $3 per day (170 days)	510.00
	Driver with Team and Vehicle, at $5 per day (50 days)	250.00
		$805.00

The above resolutions were adopted at the meeting of the Board held on January 9, 1913. (*City Record* **41**:504. *22* Ja 1913.)

The Brooklyn Institute of Arts and Sciences

Officers of the Board of Trustees

President—A. AUGUSTUS HEALY
First Vice-President—HON. CHARLES A. SCHIEREN
Second Vice-President—*HON. CARLL H. DeSILVER
Third Vice-President—COL. ROBERT B. WOODWARD
Treasurer—DANIEL V. B. HEGEMAN
Secretary—HERMAN STUTZER

Executive Committee

A. AUGUSTUS HEALY

E. Le GRAND BEERS
DR. GEORGE W. BRUSH
HON. WILLIAM J. COOMBS
THOMAS T. BARR
WALTER H. CRITTENDEN
*HON. CARLL H. De SILVER
GATES D. FAHNESTOCK
CLINTON W. LUDLUM
DICK S. RAMSAY
HERMAN STUTZER
ALFRED T. WHITE
COL. ROBERT B. WOODWARD

Committee on Botanic Garden

ALFRED T. WHITE

GATES D. FAHNESTOCK
EDWARD C. BLUM
GEORGE D. PRATT
WILLIAM A. PUTNAM

Ex Officio Members of the Board

THE MAYOR OF THE CITY OF NEW YORK
THE PRESIDENT OF THE BOROUGH OF BROOKLYN
THE COMMISSIONER OF PARKS, BOROUGH OF BROOKLYN

PROF. FRANKLIN W. HOOPER, *Director*

**Deceased, 10 March, 1913.*

PUBLICATIONS

OF THE

BROOKLYN BOTANIC GARDEN

RECORD. Established January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the annual report of the Director and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Department of Botany of the Institute. To others one dollar a year; 25 cents a copy.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

1. *The Educational Work of Botanic Gardens.* 13 pages. 1911.

2. *The Purpose of an Introductory Course in Botany.* 8 pages. 1911.

3. *Cryptomeric Inheritance in Onagra.* 11 pages, figs. 2; plates 2. 1911.

4. *On the Origin and Present Distribution of the Pine-Barrens of New Jersey.* 15 pages, figs. 2. 1912.

5. *Ingrowing Sprouts of Solanum tuberosum.* 10 pages, figs. 6; plate 1. 1912.

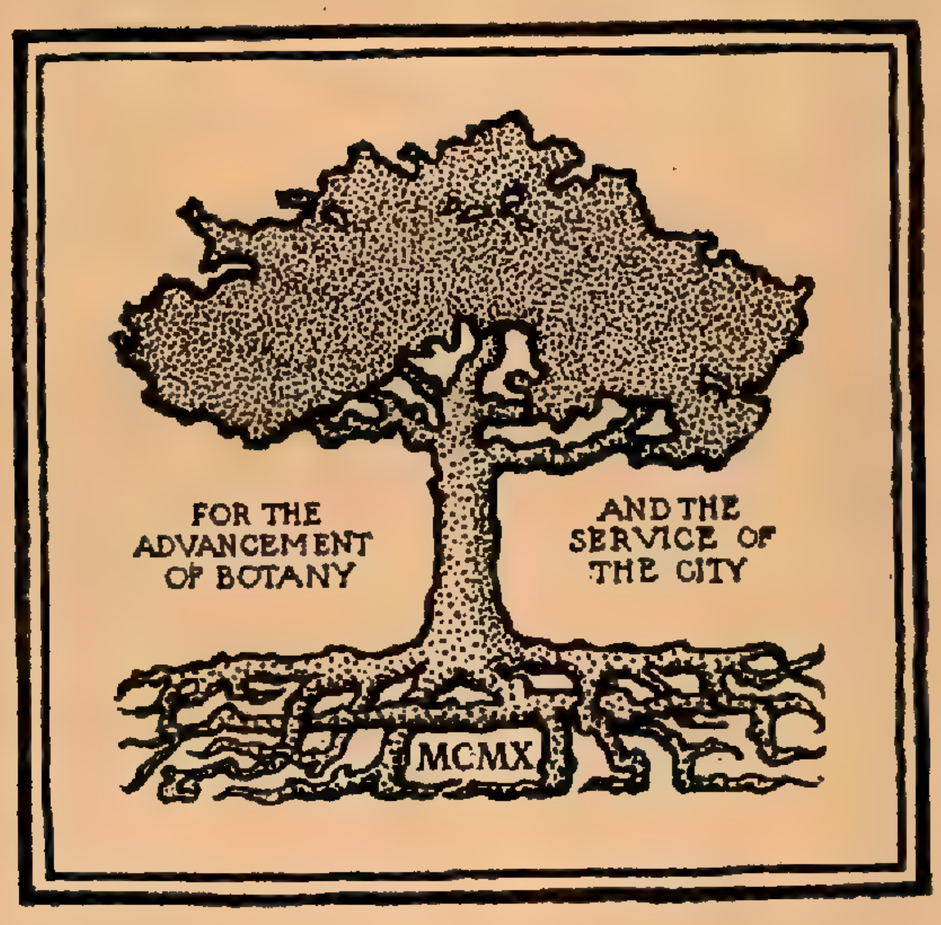
GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

1. *The Brooklyn Botanic Garden.* Price, 5 cents.

BROOKLYN BOTANIC GARDEN RECORD

VOL. II JULY, 1913 No. 3

EDITED BY
C. STUART GAGER



CONTENTS

PAGE

Nature Study in the Public Schools of Greater New York 85
Constructing the Brook 93
Brooklyn Botanic Garden Leaflets 95
Sullivant Moss Society: Ninth Public Meeting 97
Value of the Land Comprising the Brooklyn Botanic Garden 98
Municipal Action Concerning Architects' Fees 100
Notes 101

PUBLISHED QUARTERLY
BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
AT 65 DUANE STREET
NEW YORK, N. Y.

[Entered as Second Class Matter, January, 1913, at the Post Office at New York, N. Y., under Act of August 24, 1912.]

BOTANIC GARDEN STAFF

DR. C. STUART GAGER, *Director*

MR. NORMAN TAYLOR, *Curator of Plants*

DR. EDGAR W. OLIVE, *Curator of Public Instruction*

DR. WILLIAM MANSFIELD, *Honorary Curator of Economic Plants*

MISS BERTHA M. EVES, *Secretary and Librarian*

MR. HAROLD A. CAPARN, *Consulting Landscape Architect*

MR. JOHN V. BORIN, *Head Gardener*

MR. HERMAN KOLSH, *Foreman*

McKIM, MEAD & WHITE, *Architects*

OLMSTED BROS., *Landscape Architects*

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN

RECORD

VOL. II New York, N. Y., July, 1913 No. 3

NATURE STUDY IN THE PUBLIC SCHOOLS OF GREATER NEW YORK

The annual report of the president of the Board of Education of the City of New York, submitted in January, 1912, contained a recommendation to the effect that the course of study adopted by the board in 1903, and considerably modified in 1905, should be revised. This recommendation was referred by the board to its Committee on Studies and Text Books, and that committee presented a formal report on the subject on February 3, 1913. The report was printed as Board of Education Document No. 3, 1913.

The details of this report are summed up by the recommendation (p. 6), "that the course of study be revised by cutting down the time now prescribed for many subjects, increasing the time of others, and eliminating some altogether as separate subjects." Among the studies whose elimination as separate subjects was recommended was nature study. The following quotation is from page 8 of the report:

Nature Study

The syllabus covering this subject is so weighty that not even a respectable percentage can possibly be taught within the time allowed to it by the present schedule. It seems advisable to eliminate it entirely as a separate subject, but to provide for so much nature work as may be pos-

sible of introduction to be correlated in part with English and in part with geography. We believe that such specimens as are within reach may be more profitably used, and that the discussion of topics with which the children are fairly familiar will prove of far more value than the matter now required in the present syllabus.

It was further recommended (p. 10), as follows: "That the present syllabus in nature study be withdrawn, and that the subject be taught partly in connection with the English work and partly with the geography work."

While the committee insisted (p. 10) that it was not their purpose to suggest a revolution in the organization of the schools, nevertheless the above recommendation practically to eliminate nature study from the curriculum can hardly be interpreted as otherwise than revolutionary. Moreover, it is distinctly disquieting, not only to those who know from experience the educational value of nature study, properly carried on, but also to those institutions of Greater New York, such as the American Museum of Natural History, the Zoological Park, the Aquarium, the New York Botanical Garden, and the Brooklyn Botanic Garden, which find a large share of their usefulness, and even, to a certain extent, of their *raison d'être*, in co-operating in this work and supplementing it.

It is within the recent memory of the younger teachers of our schools that the struggle was first made, against considerable opposition and prejudice, to secure the introduction of a study of nature into elementary schools. And, although the literature of nature study has rapidly become voluminous, the study itself is so comparatively new, as an integral part of elementary instruction, that it may still be considered in the formative stage as to content, and to a certain extent, as to method. This is in marked contrast to such time-tried subjects as number work and language, which have been taught in elementary schools from time immemorial.

It may, however, be affirmed with assurance that nature study has been long enough in the schools to justify itself, and to demonstrate clearly that it is not a "fad" or a "frill." To have it seriously proposed, therefore, to eliminate the subject altogether from the schools, or to make it merely incidental to other work, and that more or less at the option of the teacher, is

a cause for genuine concern to all who appreciate both the educational and informational value of a study of nature at first hand. To the friends of nature study, the proposition seems little less than preposterous. To many friends of the children and to many leading educators the change would mean nothing less than an educational blunder.

It would seem to be an almost self-evident fact that children of the city, and especially of a city of the size of Greater New York, need, above all others, to be brought into touch with nature and natural objects—for their own sake, to say nothing of the educational value of the study.

From a wide experience as a teacher, and especially from a careful study of the local situation, the writer can affirm, with some assurance, that in many, if not in all, schools, real nature study has never yet been introduced. To be sure, there are class periods devoted to work which is labeled "nature study," but the actual accomplishment is, in too many cases, a travesty on the name. Class exercises are held in which the teacher endeavors to impart information about some natural object, but this, of itself, does not necessarily constitute nature study.

The writer visited a class in a local public school in which the teacher was giving a review lesson on "the dog." The first question asked was, "Jenny, what is a dog?" Poor little Jenny arose from her seat, staggered and ignorant, started several times a sentence beginning with the words, "A dog is an animal with four legs," but could go no further, and sat down in confusion. Jenny, whose father probably owned a dog, and who probably passed several of the genus *Canis* every day on her way to and from school, could not tell what a dog is. On inquiry, the writer was informed that, in teaching the lesson originally, no dog, and no picture of a dog, was present. This is not a unique instance, but may be taken as fairly representative of much that is done under the name of nature study. But the situation is equally discouraging with reference to all objects. The pupils are taught about nature, but are not taught nature —are not brought into actual contact with things themselves.

In justice to the teachers, it should here be emphasized that this condition of affairs is to almost no extent due to incom-

petence, or to inadequate preparation by the training schools and normal schools. Most of the teachers know better and could do better, and chafe under the existing situation. They are, however, required to teach lessons on a wide variety of natural objects, but not one of these objects is supplied to the teacher for such a purpose. Neither is money given for their purchase; there is not even an appropriation in the annual budget of the Board of Education for supplying material for the nature study work. High schools are supplied with material for biological work, but the elementary schools with none at all. On the face of it, is it not absurd and preposterous to require a teacher in a school on the lower east side of Manhattan, for example, to teach lessons on the early spring flowers, and then make not the slightest provision for supplying her with the necessary material for that study?

On February 18, 1913, the Committee on Studies of the Board of Education held a public hearing on the proposition to eliminate nature study as a separate subject from the public schools of the city. Representatives were present from many city institutions, and The Brooklyn Institute of Arts and Sciences was represented by its director, Prof. Franklin W. Hooper, by Mr. E. L. Morris, on behalf of the Institute Museum, and by Dr. C. Stuart Gager, on behalf of the Brooklyn Botanic Garden. Prof. Hooper and Mr. Morris spoke on behalf of the Institute and the Museum.

During the course of the discussion it became evident that the Committee on Studies still kept an open mind on the question at issue, and that they felt the immediate need to be, not the elimination of all nature study from the schools, but a revision and improvement of the work, as to both method and content. One who had studied the current course of study, and the syllabus on nature study adopted by the Board of Superintendents in October, 1905, and revised in July, 1907, and who had come into personal contact with the work as actually carried on in the elementary schools, could hardly disagree with such an attitude on the part of the Committee.

On account of the number of speakers at the hearing, and the lateness of the hour, the representative of the Botanic Gar-

den did not speak, but embodied his intended remarks in the form of a letter to the Committee on Studies. The following is the text of the letter:

February 19, 1913.

The Committee on Studies,
Board of Education,
59th St. and Park Avenue,
New York City.

Dear Sirs:—May I trespass upon your time long enough to call attention to two or three points which I had hoped to mention at the hearing last evening? Owing to the lateness of the hour, and especially to the fact that I found myself in such substantial accord with your Committee, I thought best not to speak at the hearing.

During the past two days I have been visiting public schools in Brooklyn, have heard a number of nature study lessons taught, and have talked over the subject with teachers and principals. I have also carefully studied the Course of Study and Syllabus. Nothing could be more evident than the inadequacy of this document, and the desirability of radically revising the nature study portion of it. I beg to make four suggestions:

1. That nature study be not entirely eliminated as a separate subject, nor used merely in correlation with English and geography. I believe it might well be reduced in amount in grades below 4A, and that language, drawing, and geography should be correlated with nature study. There is a real and fundamental difference between correlating nature study with English, and correlating English with nature study. The study of a natural object, as is doubtless evident to your Committee, may form the basis of an exercise in language and drawing, but not the reverse.

2. The course of study specifies such native wild flowers as hepatica, marsh-marigold, trailing-arbutus, strawberry (blossoms), Jack-in-the-pulpit, columbine, spring-beauty, and dog's-tooth violet. These are all rare and beautiful wild flowers. To secure enough specimens of any of them for all the classes in any one school (to say nothing of all the schools in the greater city) is not only practically impossible, but if it were

possible, these species would be exterminated (as indeed many of them are nearly now) in two seasons, within a radius of ten miles from the city. These species should be eliminated from the course.

3. From all I can learn, none of the nature study material has ever been supplied to public schools from the Board of Education. This is probably one of the chief reasons why the so-called "nature study" is not such, except in name; and why such a large proportion of teachers and principals are either indifferent or positively opposed to it. I saw a lesson taught on "the lion," with only a plaster-of-Paris cast of that animal as a basis. The syllabus specifies studying the characteristic motions, calls, color, and care of young. This with a plaster-of-Paris cast!

The value of the work, if properly done, would seem to justify the expenditure of a considerable sum annually to supply the teachers with suitable material. It is not that the teachers are incompetent or poorly prepared by the training schools; but the restrictions under which they work really make a high grade of nature study teaching impossible.

4. May I presume to suggest the plan of appointing a committee to revise the nature study course, and that this committee have as chairman an expert in that line (obtained from outside the city if necessary), and that both the principals of the public schools, and the public school teachers, and in addition, the biology teachers of the city high schools, be represented on the committee.

Finally, I wish to add that the Brooklyn Botanic Garden has been organized primarily to be of help to local schools in the teaching of botany and nature study, and we, in turn, would welcome any suggestions as to how we may become of greatest assistance in this connection.

I am, gentlemen,

Yours very sincerely,

C. STUART GAGER.

Up to May 15, 1913, no further action on the question by the Committee on Studies and Text Books had been announced.

C. STUART GAGER.

FIG. 13. View along the brook, July 25, 1912, looking north from just below dam No. 5. All boulders shown were transported from elsewhere by the laborers.

FIG. 14. View looking south along the brook, May 9, 1912, showing depth of excavation, and the locus of the swamp at the left middle distance. The mounds of soil around the surveyor's stakes show the level of the surface before grading.

CONSTRUCTING THE BROOK

Reference has several times been made in the RECORD to the construction of an artificial brook through the Garden. The brook extends from the lake, in the northeast corner, southward, by a winding course, to near the southern boundary of the grounds. The construction of this brook was looked forward to as rather a difficult undertaking, but, though many obstacles have been encountered, the actual work was easier than had been anticipated.

The first and most essential question to solve concerned the method of constructing the stream bed, so as to make it approximately impervious to water. One engineer suggested merely turning on a large stream from a hose and allowing the water to mark out its own course through the meadow. This, however, was not practical, as proper consideration for the plans of the landscape architect, *in toto*, made it necessary to determine the locus of the stream arbitrarily.

Another engineer was of the opinion that the bed of the stream would have to be of concrete, but this, on brief consideration, was seen to be wholly impracticable, not only because the expense involved was prohibitive, but also because a concrete bed would have been subject to serious injury by frost each winter.

It was finally decided to mark out an arbitrary streamcourse, as mapped by the landscape architect, excavate below the desired final bottom of the stream, and line the bed with clay. After this plan was determined upon, a layer of blue clay was uncovered in excavating for the laboratory building, and this layer furnished enough clay to line the entire length of the stream-bed to a depth of one foot or more.

Since a natural stream would, quite probably, not make just the curves and meanderings arbitrarily decided upon, it was considered unwise to allow the water to flow as an uninterrupted stream from source to mouth, but to plan a succession of dams and quiet reaches, except for a short distance of more gradual fall. This plan had the further advantage of adding to the scenic possibilities (fig. 13). As finally worked out, the stream contains nineteen dams, four pools, and one swamp, in addition to

the numerous quiet reaches between the dams, and one stretch of rapids.

One serious obstacle, not foreseen, was the fact that several lines of water pipes and large drainage pipes cross the course of the brook at numerous points. After various methods of protection against leakage into the drainage pipes were tried, it was found necessary completely to encase them under the stream and for some distance on either side in concrete jackets. This proved effective against draining off the water from the brook.

The dams were first constructed of concrete, extending for 12-18 inches or more into each bank, and for two or three feet below the water-level. A large glacial boulder of chosen shape was then cemented into most of the concrete bases, and the top of these boulders determines the height of the water up stream to the next dam. This method of construction is well illustrated in figure 15, which shows the dam, number 7, just above the swamp. At some portions of the stream the excavation amounted to as much as seven feet (fig. 14).

The surface geology along the brook is rather interesting, for the stream crosses the boundary between the Harbor Hill terminal moraine of the continental ice-sheet and the overwash plain lying to the south. The condition south of the moraine was much complicated by the fact that the level of the ground had been raised by fill, so that cans, bricks, and other material, not calculated to add to the imperviousness of the soil, were encountered in considerable quantity.

In excavating south of the edge of the moraine not a stone was encountered as large as a man's head, but north of this line large and small boulders were encountered in quantity (fig. 16). Some of these boulders were too large to remove (e. g. fig. 14), but one of them was of such shape, and lay in such a manner, as to form one of the dams (known as No. 13).

Between the water level of the lake and that of the terminal pool of the brook there is a total fall of nearly thirty-six feet.

As noted in the RECORD for July, 1912, water was turned into the brook for the first time on May 27, 1912. During the past spring (1913) several changes have been made, including the enlargement of the swamp, and of several pools, and minor

changes are anticipated from time to time for several seasons, before all adjustments and scenic effects will be satisfactory. The important work now remaining to be done is the completion of the planting of willows, alders, and other plants along the brook course. A rich algal flora is becoming established spontaneously both in the quiet water and on the crests of the dams; and the appearance of insect larvae, tadpoles, frogs, and small fish that have come in from the lake make the brook additionally attractive and valuable for nature study. Numbers of sandpipers and other birds have become regular frequenters of the swamp.

C. S. G.

BROOKLYN BOTANIC GARDEN LEAFLETS

On April 10, 1913, was begun the publication of the *Brooklyn Botanic Garden Leaflets*, a four-page, popular bulletin, intended primarily to keep its local constituency in touch with the Garden, by announcing the blooming or other interesting activities of plants in the Garden, and by giving popular elementary information which may be utilized by teachers of nature study and botany.

It is intended, for the present, to issue the *Leaflets* weekly or bi-weekly during the months of April, May, June, September, and October, and copies are sent without charge to all persons who wish to receive them. So far, this little publication has proved to be one of the most popular things the Garden has undertaken, and there has been rarely a mail, since the first number was issued, that has not brought from one to several requests (a total of over one hundred to June 1), to be placed on the mailing list. Schools have asked for extra copies in quantities of from 40 to 400, and requests have come from a range of territory extending from Massachusetts to Missouri and southward to Alabama. Number one can no longer be supplied, except with complete sets.

As our out-of-doors collections increase, and when the conservatories are opened to the public, and our popular educational work develops, it will doubtless become desirable to issue the *Leaflets* weekly, except, possibly, during July and August.

FIG. 15. Excavation of the brook course, showing method of construction of dam No. 7. May 14, 1912.

The cost of printing and mailing each four-page number, with an edition of one thousand copies, amounts to a little over fifteen dollars, or a total of $645 for forty-three weekly editions for ten months of the year. This is a severe drain on the present limited resources of the Garden.

The *Leaflets* may not only be made of very great value to teachers of nature study and botany in local schools, but may also become one of the most effective ways of interesting an increasingly large number of persons in the study of plants, and in the work of the Botanic Garden. Their scope and popularity could be greatly increased by the addition of a few simple illustrations. An unusual opportunity is here afforded for some one interested in promoting the study and love of plant life to endow this publication. A fund is needed sufficient to afford an annual income of from seven hundred to one thousand dollars.

SULLIVANT MOSS SOCIETY: NINTH PUBLIC MEETING

The ninth public meeting of the Sullivant Moss Society was held on May 24 at the Brooklyn Botanic Garden and the Central Museum. The sessions were held in the library and auditorium of the Central Museum building, with the president of the society, Dr. Alexander W. Evans, in the chair. Dr. Abel J. Grout exhibited several colored lantern slides of mosses and hepatics, after which the following papers were presented:

"First supplement to the Sullivant Moss Society exchange list of Hepaticae found in the United States and Canada"; Miss Caroline Coventry Haynes.

"New and interesting lichens from the State of Washington, collected by Mr. A. S. Foster"; Mr. G. K. Merrill.

"Notes on Hepaticae from Maine: a comparison with the Sarekgebirge"; Miss Annie Lorenz. Read by Dr. Edward B. Chamberlain.

"Notes on the mosses of Western Pennsylvania"; Dr. Otto E. Jennings. Read by Mrs. Annie Morrill Smith.

"The Hepaticae of Isle Royale"; Dr. George Hall Conklin. Read by title.

After the scientific program, the members viewed numerous publications on mosses, exhibited by the librarian of the museum, Miss Hutchinson; drawings and colored sketches of mosses and liverworts by Miss Annie Lorenz; photographs of mosses by Dr. Grout; photographs and autographs of bryologists, exhibited by Mrs. Annie Morrill Smith; and herbarium specimens, exhibited by Mr. E. L. Morris.

Luncheon was obtained at a nearby restaurant, after which the members visited the grounds of the Botanic Garden, and the first sections of the laboratory building and greenhouses, now nearing completion. The trip through the Garden was followed by a visit to the Central Museum, under the guidance of Mr. E. L. Morris, curator of natural history, to view the models of plants being prepared for the hall of botany by Mr. Antonio Miranda, under the direction of Mr. Morris. Adjournment was at 4:30 p. m.

THE VALUE OF THE LAND COMPRISING THE BROOKLYN BOTANIC GARDEN

The City of New York Record of Real Estate, as published in the *City Record* for May 6, 1913, gives, on page 4159 a list of the property now comprised in the Brooklyn Botanic Garden. The boundaries are given as, Eastern Parkway, Flatbush and Washington Aves., and Malbone St., and the area as 39.9 acres. The property is designated as used for the Brooklyn Botanic Garden, with a footnote stating that the area was formerly known as "Institute Park." According to the boundaries as given above, the site of the Central Museum is included in the area designated as Brooklyn Botanic Garden.*

The property consists of four parcels of land acquired as follows:

1. April 25, 1904, by condemnation, at a cost of...	$358,047.64
2. Dec. 22, 1905, from Lucy A. B. Sterling, at a cost of	12,000.00
3. Dec. 26, 1905, from Margaret Kelly, at a cost of	17,000.00
4. Nov. 25, 1907, by condemnation, at a cost of....	123,115.01
Total	$510,162.65

*The name is incorrectly given in the *City Record* as "Brooklyn Botanical Gardens."

Thus, the total cost to the City of the Garden property, including the site of the Central Museum, was over half a million dollars. The purchase from Lucy A. B. Sterling is recorded in Liber 58, page 242, and that from Margaret Kelly in Liber 58, page 243.

FIG. 16. Glacial boulders encountered in the course of the brook below dam No. 15, and just north of the line between the moraine and the overwash plain. May 9, 1912.

The information of which the above is a part covers forty-two pages of the *City Record,* and was prepared by the Comptroller of the City of New York, pursuant to a resolution adopted on May 22, 1912, by the Commissioners of the Sinking Fund of the City of New York.

The schedule does not include the transfer, on September 9, 1912 (Brooklyn Bot. Gard. RECORD **2**: 75-79. Ap 1913), by the Department of Water Supply, Gas, and Electricity, of two parcels lying east and south of the Prospect Heights reservoir.

The improvements made upon this property, since it was

assigned to The Brooklyn Institute of Arts and Sciences for Botanic Garden purposes, have, of course, greatly enhanced its value as represented by the above figures.

C. S. G.

MUNICIPAL ACTION CONCERNING ARCHITECTS' FEES

1913

March 25 THE COMMISSIONER OF PARKS, BOROUGH OF BROOKLYN, *presented the question* of fees for the architects of the laboratory building and greenhouses to the Board of Estimate and Apportionment. (*City Record* **41**:4686. 17 My 1913.)

March 27 THE BOARD OF ESTIMATE AND APPORTIONMENT *referred the matter* to its Corporate Stock Budget Committee, comprising the Comptroller, the President of the Board of Aldermen, and the President of the Borough of Manhattan (*l. c.*).

April 18 THE CORPORATE STOCK BUDGET COMMITTEE *recommended the adoption of the following resolution* (*l. c., p. 4687*):

Resolved, That, subject to concurrence herewith by the Board of Aldermen, the resolution adopted by the Board of Estimate and Apportionment on July 27, 1911, and concurred in by the Board of Aldermen on July 31, 1911, as follows:

"Resolved, That, subject to concurrence herewith by the Board of Aldermen, the resolution adopted by the Board of Estimate and Apportionment on June 3, 1910, and concurred in by the Board of Aldermen on June 28, 1910, as follows:

"'Resolved, That, pursuant to the provisions of chapter 618 of the Laws of 1906, the Board of Estimate and Apportionment hereby approves of the issue of corporate stock of The City of New York to an amount not exceeding twenty-five thousand dollars ($25,000), to provide means for the construction of plant houses in the Botanic Garden and Arboretum situated southerly from the building of the Brooklyn Institute of Arts and Sciences, and lying between Washington and Flatbush avenues, Borough of Brooklyn, under the jurisdiction of the Department of Parks, Boroughs of Brooklyn and Queens, and when authority therefor shall have been obtained from the Board of Aldermen, the Comptroller be and he is hereby authorized to issue corporate stock of The City of New York, in the manner provided by section 169 of the Greater New York Charter, to an amount not exceeding twenty-five thousand dollars ($25,000), the proceeds whereof to be applied to the purposes aforesaid,'

"—be amended by eliminating the words 'construction of plant houses,' and inserting in lieu therefore of the words *'erection and construction of a laboratory building and greenhouses, including equipment thereof.'*"

—be *amended* to read as follows:

Resolved, That, pursuant to the provisions of chapter 618 of the Laws of 1906, the Board of Estimate and Apportionment hereby approves of the issue of corporate stock of The City of New York to an amount not exceeding twenty-five thousand dollars ($25,000), to provide means for the *erection and construction of a laboratory building and greenhouses, including equipment thereof,* in the Botanic Garden and Arboretum situated southerly from the building of the Brooklyn Institute of Arts and Sciences, and lying between Washington and Flatbush avenues, Borough of Brooklyn, under the jurisdiction of the Department of Parks, Borough of Brooklyn, *and for architect's fees to the amount of $6,500, of which $2,800 shall be for the preparation of preliminary plans and specifications for the completed structure (estimated to cost $280,000, exclusive of architect's fees), and $3,700 for the full architect's fees for the final plans and specifications and the supervision of the first parts of the work,* and when authority therefor shall have been obtained from the Board of Aldermen, the Comptroller be and he is hereby authorized to issue corporate stock of The City of New York, in the manner provided by section 169 of the Greater New York Charter, to an amount not exceeding twenty-five thousand dollars ($25,000), the proceeds whereof to be applied to the purposes aforesaid.

May 8 THE BOARD OF ESTIMATE AND APPORTIONMENT *adopted the above resolution,* and directed its secretary to transmit a copy of the report of the Corporate Stock Budget Committee to the Commissioner of Parks, Borough of Brooklyn.

May 20 THE BOARD OF ALDERMEN *referred the above resolution* to its Committee on Finance.

NOTES

The twenty-fourth session of the Biological Laboratory of The Brooklyn Institute of Arts and Sciences, located at Cold Spring Harbor, L. I., opened on June 25. The regular class work will close on August 5.

The Garden was visited on May 9 by Mr. Guy West Wilson, and on May 13 by Prof. H. H. Whetzel, of Cornell University. On the afternoon of May 12, Professor Whetzel addressed the Biological Association of Erasmus Hall High School, Brooklyn.

Prof. Hugo de Vries, of Amsterdam, an honorary member of The Brooklyn Institute of Arts and Sciences, was recently elected a corresponding member of the Academy of Sciences of Paris, and also of the Royal Academy of Sciences of Prussia.

The Garden is deeply indebted to Herr Hofrat Prof. Dr. Julius von Wiesner, of Vienna, for the valued gift to our library of copies of all separate reprints of his published papers now available.

On January 10, a class of thirty pupils, with their teacher, from the Girls' High School Annex, P. S. 42, visited the Garden for the purpose of studying the birches and horsechestnuts in their winter condition. Special attention was paid to the blanket label on the girdled white birch.

Recent addresses have been given by the director of the Garden as follows: On April 1, before the Mothers' Club of Public School 47, on "The Brooklyn Botanic Garden"; on April 30, before two assemblies at the Boys' High School, Brooklyn, on "The Botanic Garden and its use to the schools and people of Brooklyn." The aggregate attendance at the two assemblies was over 2,000 boys. On May 2, an illustrated talk was given at the Training School, Jamaica, L. I., on "Spring flowers and trees of Greater New York." At the close of the address a Japanese maple was planted on the campus, in front of the building.

Volume one, number one of the Missouri Botanical Garden BULLETIN appeared in January, 1913. The publication is to be issued monthly, until further notice, and, according to the Foreword, "will be devoted almost exclusively to informing the people of St. Louis and vicinity what can be seen and learned at the Missouri Botanical Garden. * * * The BULLETIN is in no sense a scientific publication, and will not replace the volume hitherto known as the Annual Report, which in the future will be devoted

exclusively to the results of scientific research obtained in the laboratories of the Missouri Botanical Garden." The January number of each volume will contain the annual reports of the officers of the board and the director.

According to the report of the officers of the board of the Missouri Botanical Garden for the year ending December 31, 1912, the library received additions during the year 1912 amounting to $3195.95, and the herbarium additions amounting to $2120.10. New plant houses are being erected by the Pierson U-Bar Company, at a total cost of $153,000, and a residence for the director at a cost of about $26,000. The total income of the garden for 1912 amounted to $306,124.52. Nearly thirteen hundred species and varieties of living plants were added to the collections during the year, making a total of 12,451 now under cultivation. The library contains 29,683 books, 42,099 pamphlets, and 110 manuscripts, with a total valuation of $118,124.71.

The work on the first section of our laboratory building has suffered a second serious delay of about four weeks (May 1-June 1), this time owing to the non-receipt of the tile for the roof.

During May the installation of the Ecologic Section (Section IV) of the Garden was begun. This section is located along the west side of the brook, opposite the swamp, so as to include habitat conditions of running water, quiet water, falls, swamp land, and, at the opposite side from the brook, more elevated, dry land, suitable for xerophytic forms. The present installation includes twenty-four beds, in addition to the hydrophytes in the swamp and brook. The planting of the xerophytes on the higher ground will be deferred until the grading of the adjacent region during the present summer. The bog-habitat, which is already supplied by the artificial bog in the Local Flora Section, will not be duplicated in Section IV.

On May 9, the curator of public instruction, Dr. Olive, gave an Arbor Day address at the tree planting at the Commercial High School, Brooklyn. The occasion was of especial interest on account of the active participation in the exercises of the Junior Department of the American Association for the Planting

and Preservation of City Trees, under the enthusiastic leadership of Miss Carmichael, of the Children's Museum, of The Brooklyn Institute of Arts and Sciences. The juniors presented to the school one of the nine trees of oriental sycamore, the others being bought by the high school pupils, each of whom contributed three cents toward the fund for this purpose. Mrs. John J. Schoonhoven, vice-president of the association, and Mr. Levison, arboriculturist of the Park Department, also made addresses at the meeting. Other addresses were given by Dr. Olive on the evening of April 22, before the men's club of Mt. Olivet Presbyterian Church, Brooklyn, on "The Brooklyn Botanic Garden," and on the afternoon of May 20, before the engineering students of New York University, on "Camp Hygiene."

On March 26, 1913, the Garden purchased the herbarium of the late Henry Dautun, comprising about 31,000 specimens. Mr. Dautun, who died on February 23, 1913, was for several years a member of the Torrey Botanical Club, and had botanical correspondents, not only in America, but also in several countries of Europe. He was born at St. Fargeau, Yonne, France, in 1853.

On May 20, a class of about forty students from the Jamaica training school for teachers, accompanied by their instructor, Miss Burns, visited the Garden by appointment.

The staff and students of the department of biology of the College of the City of New York maintain a vigorous biological club, which conducts a seminar and other scientific meetings during the year, and gives a dinner near the close of each semester. The final scientific meeting for 1912-13 was held on the afternoon of May 22, and was followed by an informal dinner in the main building of the college. An address was given by Prof. Gary N. Calkins, professor of protozoology in Columbia University. Other invited guests of the association included Dean Brownson of the college; Prof. Earle B. Phelps, research assistant professor of chemical biology in the Massachusetts Institute of Technology; and the director of the Brooklyn Botanic Garden, all of whom made brief after-dinner remarks. Silver medals offered by an alumnus of the college and former member of the association, were awarded by Dean Brownson to several

students who had done work of exceptional merit in various branches of the department of biology.

On the afternoon of May 21, 1913, from three-thirty to six, the Japan Society and their friends were the guests of the Botanic Garden and the Central Museum. Tea was served by the Committee on Botanic Garden of the Institute trustees, and the Garden staff, but on account of the threatening weather, the tea was served in the Museum building, and not in the Garden, as announced. The trip through the Garden included the native wild flower section, a collection of shrubs from Western China, the brook, seedlings of the giant redwood (*Sequoia*), and the site of the proposed Japanese garden. The souvenir itinerary of this trip contained a picture of the laboratory building as it will appear when completed, and on the front page, the Japanese characters for "welcome." At the Museum were exhibited rare Japanese costumes and related objects recently acquired in Japan by the curator of ethnology.

The following persons visited the Garden on May 24: Prof. Alexander W. Evans, of Yale University; Miss Caroline Coventry Haynes; Dr. Marshall A. Howe; Mrs. Annie Morrill Smith; Dr. Mary L. Lines; Prof. J. Franklin Collins; Mrs. E. G. Britton; Dr. Edward B. Chamberlain; Miss Ellen Eddy Shaw; and Mr. Frank H. Ames.

From May 4 to 7, the curator of plants, accompanied by Mr. Sereno Stetson, collected herbarium material in Chester and Lancaster counties, Pa. Chester county is at the extreme southwestern part of the local flora range, and the trip was planned with a view of obtaining certain plants that are rare, or obtain their northerly limit of distribution in this region. The serpentine barrens, near Oxford, are extremely interesting from a botanical standpoint, suggesting, except for their hilliness, the pine barrens of New Jersey, but made up of a very different flora from the latter. In the rocks of the barren region large masses of the moss-pink, *Phlox subulata,* were found perfectly wild. Not more than a mile distant is a large hemlock grove, and the diversity is noticeable in many other ways. Numerous photographs, taken by Mr. Stetson, are valuable records of the

plants *in situ*. Part of a day was spent at Lancaster, inspecting the plant of a printing house which now prints many of the scientific periodicals of the United States.

The herbarium of William M. Van Sickle, Weehawken, N. J., consisting of about four thousand specimens, was purchased by the Garden on May 22, 1913. This collection is specially rich in local flora material.

On Thursday, May 29, 1913, bids were opened for the grading of most of that portion of the Garden not brought to grade by our own laboring force last season; and for the construction of the second (central) section of the conservatories (the palm-house). The specifications for grading include all materials and labor necessary to complete the following items:

1. Eighteen thousand four hundred and ninety-five (18,495) cubic yards of topsoil to be stripped and replaced.

2. Thirty-three thousand eight hundred and eighty (33,880) cubic yards of subsoil to be excavated and replaced in the Botanic Garden.

3. Eighteen thousand four hundred and ten (18,410) cubic yards of earth to be excavated in the Botanic Garden and placed in Prospect Park, across Flatbush Avenue.

Bids per cubic yard were received as follows:

Contractor	Item 1	Item 2	Item 3
John Connor	.40	.36	.39
Joseph Balaban	.40	.40	.70
M. F. Hickey	.45	.50	.65
Norton & Gorman Contg. Co.	.49	.49	.63

The total amount of the lowest bid, that of John Connor, is $26,774.70. To this must be added 5% for contingencies, and 10% for landscape architects' fees. The contract was awarded to the lowest bidder on June 5, and the specifications call for the completion of the work in 75 consecutive working days. The contractor began operations on June 30.

In accordance with a new law, which has gone into effect since the first bidding, last October, for the construction of the second section of the conservatories, separate bids must now be made for the plumbing, and for the heating, apart from the

general construction work on the foundation and superstructure. Bids were received as follows:

GENERAL

John R. Sheehan & Co.	$25,380.00
Kelly & Kelley Inc.	26,500.00
Joseph Balaban Co.	26,898.00
Concord Construction Co.	27,685.00

HEATING

Blake & Williams	$2,847.00
Smith & Theis	3,100.00
William J. Olvany	3,186.00
E. Rutzler Co.	3,235.00
James Curran Manufacturing Co.	3,896.00

PLUMBING

Altman Plumbing Co.	$585.00
Rapid Construction Co.	725.00
Degnan & Jones	730.00
R. & A. Isaacson	730.00
Joseph F. Egan	774.00
Smith & Theis	774.00
James A. Heaney	900.00
Joseph A. Graf	1,088.00

On June 19 the general contract was awarded to John R. Sheehan & Co., the heating contract to Blake and Williams, and the plumbing contract to Altman Plumbing Co. Messrs. Sheehan & Co. began work on June 30.

Dr. Charles Thom, mycologist in cheese investigations, U. S. Department of Agriculture, stationed at Storrs, Conn., called at the Garden on May 7.

In connection with the planning of the new biological building at the University of Michigan, Prof. F. C. Newcombe, professor of botany, and Professor Jacob Reighard, professor of zoology, and director of the zoological laboratory, the zoological museum, and the biological station of the university, accompanied by the architect of the proposed building, visited the Garden on June 3, to inspect the first section of our laboratory building and plant houses.

The Garden has recently purchased, of Miss Gertrude Burlingham, a set of exsiccati, comprising fifty species of the Lactariae of North America, accompanied by sixteen photographs of fresh specimens.

The last meeting of the Garden seminar, until next fall, was held at the Central Museum on Wednesday afternoon, June 11. Among those present were Dr. O. E. White, of the Bussey Institution, Harvard University, who also visited the Garden on April 19.

From May 29 to June 2 the curator of plants collected living plants in the vicinity of Amagansett and Montauk, L. I., for the Local Flora Section of the Garden. At the same time he conducted a field party for the Department of Botany of the Brooklyn Institute. About 75 living plants were collected, several packages of seed, and a few herbarium specimens.

Miss Agnes Vinton Luther, accompanied by a class of 20 from the Newark, N. J., Normal School, visited the Garden on June 24, under the guidance of the curator of public instruction.

The curator of public instruction, together with Mr. Leonard Barron, editor of the *Garden Magazine*, on the afternoon of June 24, acted as judges in a garden and flower exhibit, conducted at the Girls' High School Annex, Public School No. 42, Brooklyn. The vegetables and flowers were grown by the girls in their own gardens and window boxes, at their homes, from seeds purchased at the rate of a cent a package from the School Garden Association of Boston. A silver medal and two bronze medals were awarded to the three girls having the best exhibits, also five pins to the next best exhibits in each of the four different clubs of the school. The medals and pins, formerly furnished by the teachers themselves, were presented this year by the *New York Sunday World*.

The Brooklyn Institute of Arts and Sciences

Officers of the Board of Trustees

President—A. AUGUSTUS HEALY
First Vice-President—HON. CHARLES A. SCHIEREN
Second Vice-President—COL. ROBERT B. WOODWARD
Third Vice-President—GEORGE D. PRATT
Treasurer—DANIEL V. B. HEGEMAN
Secretary—HERMAN STUTZER

Executive Committee

A. AUGUSTUS HEALY

E. Le GRAND BEERS
DR. GEORGE W. BRUSH
HON. WILLIAM J. COOMBS
GEORGE D. PRATT
WALTER H. CRITTENDEN
GATES D. FAHNESTOCK
DANIEL V. B. HEGEMAN
DICK S. RAMSAY
HERMAN STUTZER
ALFRED T. WHITE
COL. ROBERT B. WOODWARD

Committee on Botanic Garden

ALFRED T. WHITE

GATES D. FAHNESTOCK
ALBERT DeSILVER
GEORGE D. PRATT
WILLIAM A. PUTNAM

Ex Officio Members of the Board

THE MAYOR OF THE CITY OF NEW YORK
THE PRESIDENT OF THE BOROUGH OF BROOKLYN
THE COMMISSIONER OF PARKS, BOROUGH OF BROOKLYN

PROF. FRANKLIN W. HOOPER, *Director*

PUBLICATIONS
OF THE
BROOKLYN BOTANIC GARDEN

RECORD. Established January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the annual report of the Director and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Department of Botany of the Institute. To others one dollar a year; 25 cents a copy.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

1. *The Educational Work of Botanic Gardens.* 13 pages. 1911.

2. *The Purpose of an Introductory Course in Botany.* 8 pages. 1911.

3. *Cryptomeric Inheritance in Onagra.* 11 pages, figs. 2; plates 2. 1911.

4. *On the Origin and Present Distribution of the Pine-Barrens of New Jersey.* 15 pages, figs. 2. 1912.

5. *Ingrowing Sprouts of Solanum tuberosum.* 10 pages, figs. 6; plate 1. 1912.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

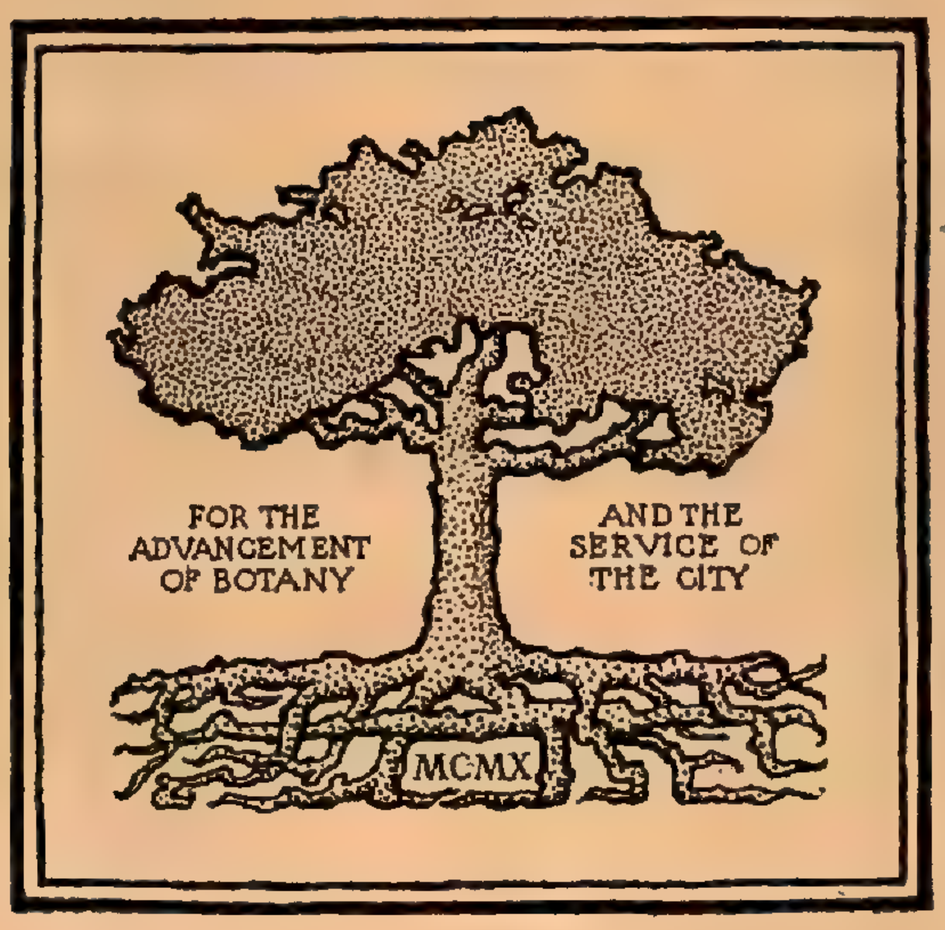
1. *The Brooklyn Botanic Garden.* Price, 5 cents.

LEAFLETS. Established April 10, 1913, and published weekly or bi-weekly during April, May, June, September, and October. The purpose of the Leaflets is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to all who wish them.

BROOKLYN BOTANIC GARDEN RECORD

VOL. II OCTOBER, 1913 NO. 4

EDITED BY
C. STUART GAGER



CONTENTS

PAGE
Foundation and Organization of the Brooklyn Botanic Garden 109
Botany in Relation to Agriculture and Other Applied Sciences 115
New Appointments to the Garden Staff 119
Doctorates Conferred in Botany by American Universities in 1913 121
Summer Courses in Botany in New York City and Vicinity, 1913 124
Notes 124
Index to Volume II 133

PUBLISHED QUARTERLY
BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
AT 65 DUANE STREET
NEW YORK, N. Y.

[Entered as Second Class Matter, January, 1913, at the Post Office at New York, N. Y., under Act of August 24, 1912.]

BOTANIC GARDEN STAFF

DR. C. STUART GAGER, *Director*

MR. NORMAN TAYLOR, *Curator of Plants*

DR. EDGAR W. OLIVE, *Curator of Public Instruction*

DR. WILLIAM MANSFIELD, *Honorary Curator of Economic Plants*

DR. O. E. WHITE, *Assistant Curator of Plant Breeding*

MISS ELLEN EDDY SHAW, *Instructor*

MISS BERTHA M. EVES, *Secretary*

MISS HELEN VIRGINIA STELLE. *Librarian*

MR. HAROLD A. CAPARN, *Consulting Landscape Architect*

MR. JOHN V. BORIN, *Head Gardener*

MR. HERMAN KOLSH, *Foreman*

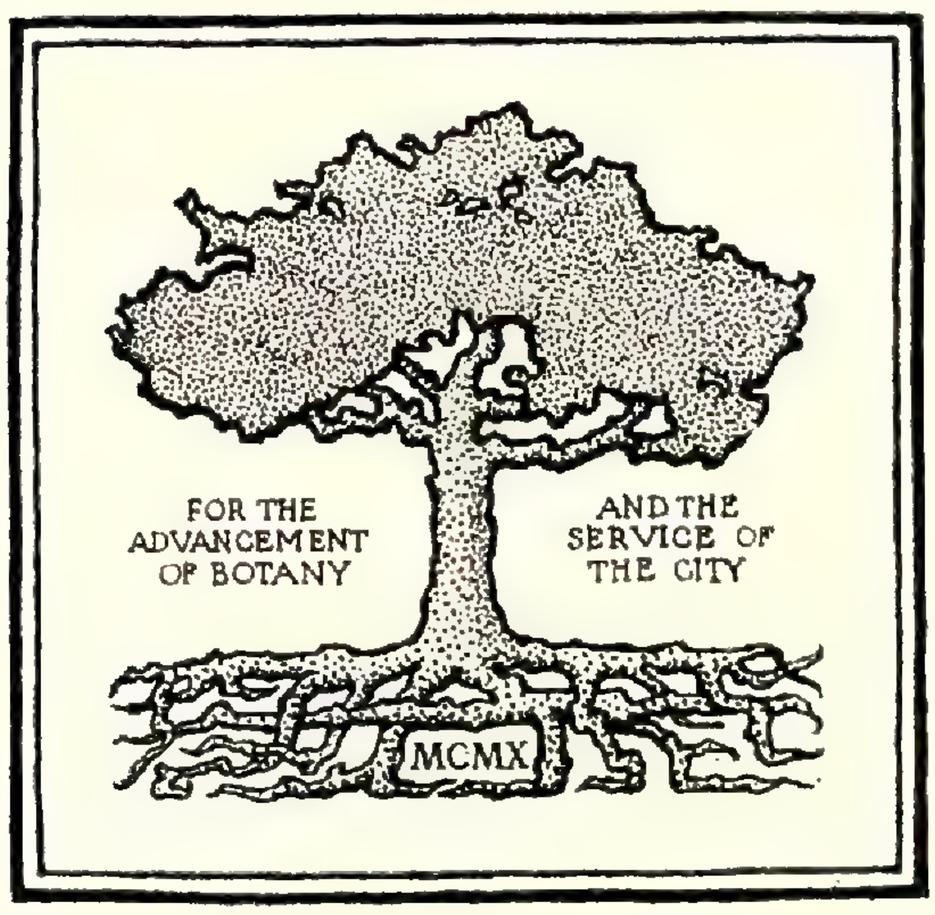
McKIM, MEAD & WHITE, *Architects*

OLMSTED BROS., *Landscape Architects*

BROOKLYN BOTANIC GARDEN RECORD

EDITED BY

C. STUART GAGER



VOLUME II

1913

PUBLISHED QUARTERLY
BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
AT 65 DUANE STREET
NEW YORK, N. Y.

PRESS OF L. MIDDLEDITCH CO.
NEW YORK CITY

TABLE OF CONTENTS

No. 1, JANUARY

Tree Planting by Prof. de Vries 1
Letchworth Park and Arboretum 7
Meeting of the American Association for the Planting and Preservation of City Trees 9
Organization of Children for the Planting of Trees 10
Conference with High School Teachers 11
Report of a Trip to Botanical Institutions 12
Report of a Trip to Rochester and to the Arnold Arboretum 15
School Gardens in Ceylon 18
Lincoln Place Tree Association 21
Notes 21

No. 2, APRIL

Second Annual Report of the Brooklyn Botanic Garden, 1912 25
Report of the Director 25
Report of the Curator of Plants 46
Report of the Curator of Public Instruction 60
Report of the Secretary and Librarian 67
Financial Statement 71
Appendix 1: Amended Agreement of September 9, 1912 75
Appendix 2: Municipal Action on the Amended Agreement 79
Appendix 3: Municipal Action on Appropriations for Buildings 80
Appendix 4: Municipal Action on the Tax Budget for 1913 81
Appendix 5: Resolutions Approving the Issue of Corporate Stock . . 81
Appendix 6: Resolutions of Board of Estimate and Apportionment Approving Transfers in the Tax Budget for 1912 83

No. 3, JULY

Nature Study in the Public Schools of Greater New York 85
Constructing the Brook 93
Brooklyn Botanic Garden Leaflets 95
Sullivant Moss Society: Ninth Public Meeting 97
Value of the Land Comprising the Brooklyn Botanic Garden 98
Municipal Action Concerning Architects' Fees 100
Notes 101

No. 4, OCTOBER

Foundation and Organization of the Brooklyn Botanic Garden 109
Botany in Relation to Agriculture and Other Applied Sciences 115
New Appointments to the Garden Staff 119
Doctorates Conferred in Botany by American Universities in 1913 121
Summer Courses in Botany in New York City and Vicinity, 1913 124
Notes 124
Index to Volume II 133

ILLUSTRATIONS

	Page
Hugo de Vries	Frontispiece
Prof. de Vries Planting the Sweet-Gum Tree	2
Sweet-Gum Tree (Liquidambar Styraciflua), planted by Prof. de Vries	4
Tree Planting Group, September 12, 1912	5
Entrance Sign	Opp. p. 25
Laying the Foundations of Section I of the Laboratory Building	28
Beginning the Superstructure, Laboratory Building and Conservatories; Section I	31
Area East of Mt. Prospect Reservoir, Assigned to the Institute for Botanic Garden Purposes	35
Shaded Path Along the Border Mound, West of the Local Flora Valley	47
Shrub Planting on the Eastern Slope of the Local Flora Valley, July 25, 1912	52
Local Flora Valley, Aug. 14, 1911	53
Preparation for Willow Planting: Terminal Pool of the Brook, October 17, 1912, Facing East	55
View Along the Brook, July 25, 1912, Looking North From Just Below Dam No. 5	91
View Looking South Along the Brook, May 9, 1912, Showing Depth of Excavation, etc	92
Excavation of the Brook Course, Showing the Method of Constructing Dam No. 7	96
Glacial Boulders Encountered in the Course of the Brook Below Dam No. 15, etc	99
International Phytogeographical Excursion, 1913: Visit to the Garden, July 27	Opp. p. 109

ERRATA

Page 40, line 24, for *Stryaciflua* read *Styraciflua*.
" 44, line 19, " " " " "
" 106, line 14, " 18,496 read 17,220.
" " line 16, " 33,880 " 35,552.
" " line 19, " 18,410 " 12,638.

FROMME BLAKESLEE TAYLOR WILSON PAULSEN
NICHOLS WILLIAMS STOMPS RYDBERG
KLEIN HARPER HOLLICK GAGER SCHRÖTER SHULL COWLES DODGE

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

BROOKLYN BOTANIC GARDEN

RECORD

VOL. II Brooklyn, N. Y., October, 1913 No. 4

FOUNDATION AND ORGANIZATION OF THE BROOKLYN BOTANIC GARDEN*

In 1897 the Hon. George W. Brush, M.D., introduced into the Legislature of New York State a bill for the establishing and maintaining of a "Botanic Garden and Arboretum for the collection and culture of plants, flowers, shrubs and trees, the advancement of botanical science and knowledge, and the prosecution of original researches therein and in kindred subjects, for affording instruction in the same, and for the prosecution and exhibition of ornamental and decorative horticulture and gardening, and for the entertainment, recreation and instruction of the people."

For these purposes the Commissioner of Parks of the City of Brooklyn was "authorized and required to set apart and appropriate all of that portion of Prospect Park bounded northerly by the Eastern Parkway, easterly by Washington Avenue, southerly by the line formerly dividing the City of Brooklyn from the late town of Flatbush, and westerly by Flatbush Avenue, excepting only such lands as have been reserved for the Prospect Hill reservoir, and such other lands as have been leased to The Brooklyn Institute of Arts and Sciences." This bill became a law on May 18, 1897, and comprises Chapter 509 of the Laws of 1897.

At a meeting of the Board of Trustees of the Brooklyn Institute of Arts and Sciences, held in June, 1905, a communica-

*Since a consecutive account of the organization of the Garden, and the various steps leading thereto, has never appeared in a Garden publication, it has been thought desirable to place the matter on record at this time.

tion was received from Mr. Alfred T. White, stating that several friends of the Institute had authorized him to offer to the Institute the sum of $25,000, to be used in equipping a scientific botanic garden, whose primary purpose should be the teaching of botany to students in the public and private schools of the city, and to the general public, provided such a garden be established on the grounds adjacent to the Museum. The communication was accompanied by a check for $1,000, to be used as far as necessary in obtaining information and preliminary plans for the establishment of the proposed garden. On December 28, 1906, this offer of $25,000 was changed to a subscription of $50,000, made under the same conditions.

By the authority of the Board of Trustees, a special committee on plan and scope of a botanic garden was appointed, as follows: Charles A. Schieren, Lowell M. Palmer, Alfred T. White, Franklin W. Hooper, Henry E. Chapin, Frederic A. Lucas, George C. Brackett, William H. Maxwell, Nathaniel L. Britton, James Dean, and Abel J. Grout. This committee held a meeting on June 27, 1905, when arrangements were made for securing information with regard to existing botanic gardens.

During the educational year of 1905-06 this committee gathered information with regard to botanic gardens in this country and abroad, and prepared a bill to be introduced in the State Legislature, the purpose of which was to amend Chapter 509 of the Laws of 1897, above referred to. This bill provided that "Whenever the Brooklyn Institute of Arts and Sciences, incorporated by chapter one hundred and seventy-two of the laws of eighteen hundred and ninety, shall have raised or secured by private subscription the sum of fifty thousand dollars within one year from the passage of this act, the principal of which or the income thereof to be set apart and used by the said Institute for the purchase of plants, flowers, shrubs and trees, to be set out in said Botanic Garden and Arboretum," the City of New York was authorized to enter into an agreement with The Brooklyn Institute of Arts and Sciences "for the establishing and maintaining by said Institute of a Botanic Garden and Arboretum," on lands previously designated; and

the Board of Park Commissioners was "authorized to construct and equip * * * suitable plant houses * * * and rooms for instruction in botany." For the purpose of providing means therefor, the Comptroller of the City of New York was directed, upon the request and authorization of the Board of Park Commissioners and the Board of Estimate and Apportionment and the Board of Aldermen respectively, "to issue and sell corporate stock of the City of New York * * * aggregating the sum of one hundred thousand dollars." The City was also authorized to provide for the annual maintenance of the Garden.

This bill was approved by the Park Department of the City, passed by the Legislature, approved by Mayor McClellan, and was signed by Governor Higgins on May 24, 1906, becoming Chapter 618 of the Laws of 1906. In the spring of 1907 a form of agreement between the City and the Institute was prepared in pursuance of the law, was approved by the Board of Park Commissioners of the City in December of that year, and sent by that Board to the Board of Estimate and Apportionment. On June 24, 1909, the Board of Estimate and Apportionment voted unanimously to establish the Garden, and on December 28, 1909, a contract was entered into between the City and the Institute upon the authority of the Board of Estimate and Apportionment of the City and the Board of Trustees of the Institute. The full text of this agreement and contract was published in the Brooklyn Botanic Garden RECORD, volume I, pages 7-16, January, 1912.

A topographical survey of the Botanic Garden lands was made in the spring of 1910, by D. Barta & Co., and Olmsted Brothers, Landscape Architects of Brookline, Mass., prepared during the summer a general plan for the Garden. The Board of Estimate and Apportionment and the Board of Aldermen appropriated, in June, 1910, $25,000 "for the construction of plant houses," and also $25,000 "for the construction of rooms for instruction in botany." On February 3, 1910, Prof. C. Stuart Gager was appointed director of the Garden, the appointment to take effect on July 1; and on July 15, Messrs.

McKim, Mead & White were officially designated as architects for the laboratory building and conservatories to be erected in the Garden.

In December, 1910, Messrs. Olmsted Brothers submitted a preliminary plan for the grounds, and Messrs. McKim, Mead & White completed the preliminary plans for the laboratory building and the conservatories. Both plans were approved by the Board of Trustees of the Institute, by Mr. Samuel Parsons, the then Landscape Architect of the Department of Parks of the City, and by the Hon. Michael J. Kennedy, Park Commissioner of the Boroughs of Brooklyn and Queens. In April, 1911, working drawings and specifications for the southern section of the laboratory building, and the northeast wing of the conservatories, and the general heating plant between the two, were completed by the architects for advertising and public letting. The contract was finally let to Cockerill & Little Co., for $55,800, in accordance with a resolution of the Board of Estimate and Apportionment, adopted at its meeting of January 4, 1912, approving of this sum as the estimate of cost. The work on this section began on April 8, 1912, and the contract called for its completion in 150 working days. Owing to various and prolonged delays, the buildings were not ready for occupancy until September 25, 1913, on which date they were first occupied. Details concerning appropriations, plans, bidding, letting of contract, and commencement of work on the second section (the main plant house), and concerning appropriations for maintenance have already appeared in the RECORD.

On February 1, 1911, the Garden lands were turned over to the Institute in pursuance of the agreement made between the City of New York and The Brooklyn Institute of Arts and Sciences, on December 28, 1909. The work of developing and planting the Garden was begun on April 1, and as previously recorded in the RECORD, the Garden was first opened to the public on May 13.

The original area of the Garden, exclusive of the site of the Central Museum, comprises approximately thirty-nine acres, lying south of the Central Museum building of the Institute and the Mt. Prospect reservoir, between Flatbush Avenue

on the west and Washington Avenue on the east. The southern boundary of the grounds coincides with the line between the old city of Brooklyn and the old town of Flatbush. In addition there are a little over three acres in the land surrounding the Mt. Prospect reservoir, including a strip 20 feet wide south of the reservoir, and a tract 250 feet wide between the Museum grounds on the east and the reservoir on the west. This land was transferred to the Park Department for Botanic Garden purposes on September 9, 1912, in accordance with the provisions of Chapter 618 of the Laws of New York of 1906, as amended by Chapter 178 of the Laws of 1911, and brings the total area to nearly forty-three acres.

The administration of the Garden is under the general supervision of the Committee on Botanic Garden of the Board of Trustees of The Brooklyn Institute of Arts and Sciences. This Committee is at present composed of Mr. Alfred T. White, Chairman, Mr. Albert DeSilver, Mr. Gates D. Fahnestock, Mr. George D. Pratt, Mr. William A. Putnam and, ex officio, Mr. A. Augustus Healy, President of the Institute, and Prof. Franklin W. Hooper, Director of the Institute.

As stated in the original act of 1897, providing for the establishment of the Garden, the purpose of the Garden is the very obvious one of "the collection and culture of plants, flowers, shrubs and trees," and furthermore, "the advancement of botanical science and knowledge, the prosecution of original researches therein and in kindred subjects, [and] for affording instruction in the same." Other objects named are the "prosecution and exhibition of ornamental and decorative horticulture and gardening, and for the entertainment, recreation and instruction of the people."

It was the wish of those who have been instrumental in securing the establishment of the Garden, that, in addition to research work, it should, to a greater degree than has hitherto been realized, or even attempted by botanical gardens, engage in the formal teaching of botany, and that it should become the means of encouraging and aiding the botanical work of local schools of all grades, elementary, secondary, and collegiate, both public and private. Provision will therefore be made for giving

formal instruction to classes in both elementary and advanced courses, and opportunities will be freely offered to teachers in local schools to use the Garden collections, laboratories, classrooms, library, conservatories and plantations in any way that may facilitate their work. To this end, two ample classrooms and an elementary laboratory are included in the plans for the laboratory building, while one of the houses of the conservatories, adjacent to the laboratory building, will be devoted primarily to this work. So far as the resources of the Garden will permit, study material will be freely supplied to schools for class use.

In addition to the work of formal instruction, it is the purpose of the Garden authorities to offer every possible facility for investigation. In addition to the elementary laboratory, the plans of the building include three laboratories for advanced work, a physiological dark-room, a constant temperature room, and, in addition to these, ten private research rooms, for the use of registered investigators. One of the conservatory houses is designed primarily for research work, and a portion of the grounds is assigned as an experimental garden, to facilitate work in experimental evolution and plant breeding.

On account of the ample facilities in systematic botany already offered elsewhere in Greater New York, no special effort will be made for the present to develop this phase of the science, except in so far as is necessary in the administration of our living collections, and as a natural outgrowth of the work of the Garden as a whole. Emphasis will be placed largely on the experimental phases of botany, while a herbarium will be developed chiefly with reference to the local flora, the collections of living plants, and the needs and activities of the other departments of the Garden.

The departmental organization of the Garden and the classification of the plantations have already been given in detail in the RECORD for April, 1912.

C. S. G.

BOTANY IN RELATION TO AGRICULTURE AND OTHER APPLIED SCIENCES

While botany, as the study of spring flowers, or of the classification of flowering plants, is indeed a fascinating pastime, it is avowedly a much more serious and interesting subject when viewed in a broader way as a fundamental science underlying agriculture and many other applied sciences. Botany is, in fact, no longer narrowly regarded merely as the study of flowers, but rather as the scientific study of plants as a whole, viewed from all possible points of view.

As the science which arranges in an orderly fashion all the known facts about plants, and ever seeks new facts about them, botany ranks on an equal footing with its great sister science, zoology, as a component of the subdivision of biology, which treats of living things. Biology, in turn, may conveniently be placed alongside physics and chemistry, the three constituting the very foundation stones of all the subsidiary natural sciences.

This is indeed the day of specialism in science. Among the devotees of what has sometimes been called "pure botany," dealing more directly with the older and narrower view of the subject, are systematic botanists, or taxonomists, who classify plants; physiologists, who study plants in relation to their activities and functions; cytologists, who study primarily the vital activities and functions of the cells of which plants are composed; ecologists, who study plants in relation to their environment; plant geographers, who study plant distribution as influenced by soil and climatic factors; morphologists, who study largely form and structure and deduce therefrom ideas of evolutionary relationship.

In recent years, we have begun to apply our studies of plants more directly to human needs. "Applied botany," while perhaps ill deserving the sharp separation from the so-called "pure science" insisted on by a diminishing few, concerns itself primarily with an immediate economic, or practical, end. Scientific men, as well as some broad-minded administrators, are coming to believe, however, as has been long insisted on by President Van Hise, of the University of Wisconsin, that all scientific investigation, no matter how seemingly remote the im-

mediate concrete value to mankind, will ultimately weave itself, often in an entirely unexpected manner, into close relation to matters of undoubted practical value. It is, in fact, one of the paradoxes of human progress that certain practical ends are often best served by work which is pursued independently of immediate practical considerations. No one could have predicted, for example, twenty-five years ago, that the purely abstract studies at that time on the Hertzian waves were to form the foundation of modern wireless telegraphy, nor, in 1860, that Pasteur's studies on yeasts and fermentation were to be the starting point of our wonderful advance in bacteriology and in our knowledge of the germ causes of disease.

Our ever broadening conceptions of the relations of "pure" and "applied" botany are, indeed, rapidly breaking down the barriers which, on the supposition that they were actuated by different ideals, have been erected between them. As now pursued by broadly trained investigators, modern "practical" botany may, indeed, be based on as high ideals as any of those which inspire the supposedly "non-practical." Search for basic, fundamental truths, or for the application of principles, or for broad conceptions of the interrelations of plants may, undoubtedly, form the ideal of such studies as those on the fungous diseases of the sugar-beet or potato or corn, as well as that which deals with certain physiological reactions of the dandelion. The scientific men themselves, on the one hand, are coming to agree that broad, fundamental questions may often be solved by means of problems which have an economic end immediately in view; and, on the other hand, the public also is beginning to appreciate that the pursuit by scientific workers of "truth for truth's sake," and of broad, fundamental questions and principles, ultimately ends in economic gain.

Botany, then, in the broadest sense, as the scientific study of plants from all points of view, their structure, classification, activities and interrelations, forms the essential foundation of a goodly number of highly specialized, applied superstructures. In this paper some of these specialized subjects are enumerated, and their intimate connection with the fundamental principles of botany are pointed out.

The intimate interlocking of botanical science with the science of agriculture and allied applied sciences is well illustrated in the work of our admirably organized Bureau of Plant Industry, and certain other subdivisions of the United States Department of Agriculture. Here, one group of botanists explores the drier regions of the West, and seeks to find in the study of the native plants of those regions the principles which shall enable us better to understand dry farming; others explore the world for new plants, particularly for those likely to be of use for human or animal food. Still others apply the principles of plant physiology, or those of soil physics, to the ultimate end of how to raise better crops. A rapidly increasing number of botanists, both of the Department of Agriculture as well as of state experiment stations, are plant pathologists, who study the diseases of plants and their cure. Another growing group are the plant breeders, who seek in their studies the laws underlying heredity, as well as the best way to apply these principles to the production of better and more useful plants.

Drug plants are now studied from various points of view by highly trained botanists. Some specialists, the pharmacognosists, study the gross and microscopical characters of medicinal plants; others are food and drug analysts; still others study the poisonous or other chemical characteristics of these plants. Another division of economic botanists studies the food and fiber plants and their characteristics; still another, the forage possibilities of cacti, of native wild grasses, or of other plants.

That subdivision of botanical science known as horticulture deals with the principles underlying the cultivation of trees, shrubs, and garden plants; forestry, with those underlying the propagation of forests and the economic production of lumber. Gardening proper, as well as certain subdivisions of agronomy, or field agriculture, is based at heart largely on the principles of plant physiology and soil physics.

Among the highly specialized applied sciences which have split off far from pure botany is bacteriology, which had its start with the work of Pasteur and Koch. The bacteriologist in recent years has begun to extend his studies even beyond the minute plants called bacteria, so as to include in his investiga-

tions other microscopic organisms, such as the pathogenic protozoa and the minute molds and other fungi. The methods of cultivating these minute organisms have developed a complicated and highly specialized technique, which is now often utilized by other groups of scientists than pure bacteriologists. For example, bacteriological methods are extensively employed for the cultivation of organisms which produce disease among plants, for growing molds and other fungi in studies on fermentative or other changes in cheese, milk, etc., as well as in the growing of yeasts for the brewing industries. There has even sprung up a special division of plant bacteriology, as a rapidly increasing number of diseases of plants have been found to be caused by bacterial organisms; and another of soil bacteriology, to study the wonderfully important bacterial activities in soils.

In recent years, there has arisen a fertile field for applying botanical knowledge in the study of the micro-organisms of drinking water. By a microscopic examination, the cause of evil odors or tastes in water is often readily traced to plant causes, thus suggesting at once the proper remedy. Finally, botanical science touches biochemistry at many points. The biochemist analyzes plant products of all sorts, including foods, poisons and drugs.

The foregoing brief analysis, showing the fundamental relation of botany to agriculture and other applied sciences, suggests many possible lines of useful work for the Botanic Garden. Such work, if emphasized, may readily be made very useful to the community directly served by the Garden, as well as to the country at large. Not alone along the lines of research and exploration in problems of special interest, and by acting in consultation with citizens seeking information and advice, but also in teaching many of these subjects, the staff of the Garden may render valuable service to the community. Besides the elementary instruction to grammar school and high school pupils, and the more advanced instruction to teachers and others now planned, the Garden would undoubtedly serve a useful purpose in offering courses in gardening or in agricultural botany. Work of this sort is in close harmony with the purposes for which the Garden was established, as stated in the original Act of the State

Legislature, of 1897, providing for the establishment of the Garden. In this Act the purpose of the Garden is indicated to be, in part, "the collection and culture of plants, flowers, shrubs and trees * * * the advancement of botanical science and knowledge, the prosecution of original researches therein *and in kindred subjects,* [and] for affording instruction in the same." There is no doubt but that such instruction, which is exactly in line with the modern tendency to make education directly useful, would prove immensely popular in this community.

E. W. O.

NEW APPOINTMENTS TO THE GARDEN STAFF

At a meeting of the Botanic Garden Committee of the Board of Trustees, held on July 2, 1913, the appointment of the following new members of the Garden staff was approved: Dr. Orland Emile White, Assistant Curator of Plant Breeding; Miss Ellen Eddy Shaw, Instructor; Miss Helen Virginia Stelle, Librarian; Mr. Guy Bisby, Laboratory Assistant.

Dr. White's academic and professional record is as follows: B. S., South Dakota State College, 1909; M.S., 1911; M.S. in Botany, Graduate School of Applied Science, Harvard, 1912; S.D., 1913. Hilton Scholar, Graduate School of Applied Science, Harvard, 1911-12; Emerson Scholar, 1912-13. General nursery work with the Yankton Nursery, Yankton, S.D., 1903. Student assistant in plant breeding, Horticultural Department, South Dakota Agricultural Experiment Station, Brookings, S.D., 1904; student assistant in botany, South Dakota State College and Agricultural Experiment Station, 1905 (summer), and 1907-1909; assistant in sugar-beet seed investigations, U. S. Department of Agriculture, 1907 (summer); research assistant in botany, S. D. State College and Experiment Station, with residence during the summer of 1909 at the botanical laboratories of the University of Wisconsin, 1909-1910; graduate student in the Laboratory of Genetics, Bussey Institution, 1910 (summer); instructor in botany in the South Dakota State College and

Experiment Station, 1910-11; laboratory teaching assistant in botany, Radcliffe College, 1912; laboratory teaching assistant in genetics, Radcliffe, 1913.

Miss Shaw is widely and favorably known as a successful organizer and worker in elementary gardening and nature study. After graduating from Tufts College in 1902, she studied for one year in Tufts Medical College, Boston. During the summer of 1901, she was a student in the seaside laboratory of Tufts, at Harpswell, Maine. Her educational and professional record is as follows:

1898-1901.	Teacher of biology, high school, Wayland, Mass., and supervisor of nature study in Wayland and Cochituate, Mass.
1902-1904.	Teacher of science, Needham (Mass.) high school.
1904-05 & 1907-09.	Supervisor of nature work and teacher of methods, New Paltz (N. Y.) Normal School.
1905-1907.	The same, Rochester, N. Y., City Training School.
1909-present.	Editorial work in nature study for the *Garden Magazine* and *Country Life in America*.
1910-1913.	Teacher of nature study at Ethical Culture School, New York City.
1912-1913.	Instructor in school gardening methods, Pratt Institute Kindergarten Department.
1910.	Inaugurated school garden work at New Rochelle, N. Y., under the auspices of the National Plant, Flower, and Fruit Guild, of which organization she was secretary in 1912.
1911.	Inaugurated "back yard gardening" at Flushing, L. I.
1910-1912.	Lecturer on nature study before teachers' institutes in West Virginia (1910), and South Carolina (1912), and in New York State from 1904-1911.

Miss Shaw is the author of "Farming and Gardening," a book of 376 pages, in the Child's Library of Work and Play, published by Doubleday, Page & Co.; of various magazine articles; and of the course of study in nature work for the training school in Portland, Me.

Miss Stelle combines a year's experience (1911-1912) as librarian of the college library of Shurtleff College (Upper Alton, Ill.), and a year's study at the Pratt Institute School of Library Science (1912-1913), with five years' experience as a teacher of botany and elementary biology in Lamark (Ill.) high school (1906-1910), and Upper Alton high school (1910-1911). She was a student in Shurtleff College for three years (1903-1906).

Mr. Bisby received the degrees of B. S. (Bachelor of Science) and Ph. G. (Graduate Pharmacist), at the State College of South Dakota in 1912. From 1912-1913 he was assistant in botany at the same institution, giving the courses in pharmacognosy and systematic botany, and recently cooperated with Mr. J. T. Sarvis, now of the U. S. Department of Agriculture, in a revision of the flora of South Dakota.

DOCTORATES CONFERRED IN BOTANY BY AMERICAN UNIVERSITIES IN 1913

Of the 231 doctorate degrees conferred this year by American Universities in the natural and exact sciences, 34 were given in botany, an increase of 4 over last year. Of this number, Cornell conferred 13; Harvard 4; Pennsylvania, Michigan, and Washington Universities 3 each; Columbia 2; Johns Hopkins, Chicago, Wisconsin, Minnesota, Nebraska, and Tulane 1 each.

The following list of doctorate theses in botany given in 1913 has been taken from the compilation published in *Science*, N. S. **38:** 259-267. 22 Au 1913.

Cornell University

Adeline Sarah Ames: "Studies in the Polyporaceae."

Maxwell Jay Dorsey: "Pollen development in *Vitis* with special reference to sterility."

Alfred Washington Drinkard, Jr.: "Heredity and variation in *Browallia*."

Mary Alida Fitch: "Studies in transpiration."

Harry Morton Fitzpatrick: "A comparative study of the development of the fruit body in *Phallogaster, Hysterangium* and *Gautieria*."

Margaret Graham: "Studies in nuclear division of *Preissia commutata*."

Bascombe Britt Higgins: "A contribution to the life history and physiology of *Cylindrosporium* on stone fruits."

George Richard Hill, Jr.: "The relation of ripe and unripe fruits and germinating seeds to air."

Tanomo Odaira: "A study of heredity and variation in pure lines and in hybrids of *Phaseolus vulgaris*."

Martin John Prucha: "Can the efficiency of *Bacillus radicicola* in producing nodules on the legumes be altered?"

Fred M. Rolfs: "A bacterial disease of the stone fruits due to *Bacterium pruni* E. F. S."

Vern Bonham Stewart: "The fire blight disease in nursery stock."

Roland Elisha Stone: "The life history of *Ascophyta* of some leguminous plants."

COLUMBIA UNIVERSITY

Michael Levine: "Studies in the cytology of the Hymenomycetes, especially the Boleti."

Arlow Burdette Stout: "The individuality of the chromosomes and their serial arrangement in *Carex aquatilis*."

JOHNS HOPKINS UNIVERSITY

George Clyde Fisher: "Seed development in the genus *Peperomia*."

HARVARD UNIVERSITY

Rollins Adams Emerson: (a) "A genetic study of plant height in *Phaseolus vulgaris*"; (b) "The inheritance of a recurring somatic variation in variegated ears of maize."

John William Hotson: "Culture studies of fungi producing bulbils and similar propagative bodies."

Edmund Ware Sinnott: "The morphology of the reproductive structures in the Podocarpineae."

Orland Emile White: "Studies of teratological phenomena in their relation to evolution and the problems of heredity."

UNIVERSITY OF CHICAGO

George Lester Kite: "The relative permeability of the surface protoplasm of animal and plant cells."

UNIVERSITY OF MICHIGAN

Frank Caleb Gates: "The relation of winter in the xerofyty of peat bog ericads."

Walter Byron McDougall: "On the mycorhizas of forest trees."

Charles Herbert Otis: "Transpiration of emersed water plants; its measurement and its relationships."

UNIVERSITY OF PENNSYLVANIA

Thomas Franklin Manns: "Some new bacterial diseases of legumes and the relationships of the organisms causing the same."

Francis Whittier Pennell: "Studies in the Agalinanae, a sub-tribe of the Rhinanthaceae."

Jacob Joseph Taubenhaus: "Diseases of the sweet pea."

UNIVERSITY OF WISCONSIN

Irving E. Melhus: "Germination and infection in certain Oomycetes."

WASHINGTON UNIVERSITY

Jacob Richard Schramm: "A contribution to our knowledge of the problem of free nitrogen fixation in certain species of grass-green algae with special reference to pure culture methods."

Mildred Webster Spargo Schramm: "The genus *Chlamydomonas*."

Charles Oscar Chambers: "The relation of Algae to dissolved oxygen and carbon dioxide with special reference to carbonate."

UNIVERSITY OF MINNESOTA

Elvin Charles Stakman: "A study in cereal rusts: physiological races."

UNIVERSITY OF NEBRASKA

Raymond John Pool: "A study of the vegetation of the sandhills of Nebraska."

TULANE UNIVERSITY

Eleanor Elmire Reames: "On fresh-water Chlorophyceae and Cyanophyceae of southern states."

Although not strictly botanical, the following theses deal largely with plants from a chemical standpoint. All three were presented at the University of Wisconsin.

William Harold Peterson: "Forms of sulphur in plants."

Roy Lee Primm: "Some phenomena associated with cellulose fermentation."

Nellie Antoinette Wakeman: "Plant pigments other than chlorophyll."

E. W. O.

SUMMER COURSES IN BOTANY IN NEW YORK CITY AND VICINITY, 1913

During the past summer, courses in botany were offered in New York at Columbia University, and at Cold Spring Harbor, L. I., in the Biological Laboratory of the Brooklyn Institute. In all, six courses were offered, and the total registration was fifty, as follows:

Institution	Title of Course	No. of Students	Lect., Lab., or Both
Brooklyn Institute	Cryptogamic Botany	3	Both
" "	Plant Geography & Ecology	4	"
Columbia University	Botany 1. General Botany	22	"
" "	" 101 Physiology	12	"
" "	" 112 Bryophyta & Pteridophyta	5	"
" "	" 241 Research	4	25 hrs. a week

At Cold Spring Harbor the courses were given by Prof. Harlan H. York, of Brown University, and Prof. John W. Harshberger, of the University of Pennsylvania; at Columbia, by Prof. C. C. Curtis and Mr. Otto Kunkel. The courses given in New York University last year were not offered in 1913. For 1913 there was a total of six different courses offered, with a registration of fifty, as against seven in 1912, with a registration of fifty-seven.

NOTES

The foundation for the central plant house of the conservatory range was completed on August 9, ready for the superstructure. The work of erecting the superstructure began September 2.

As stated in the preceding issue, the successful bidder for the grading contract, Mr. John Connor, began operations on June 30; his official time of 75 consecutive working days began on July 14. With reasonable allowances for bad weather, holidays, and other interruptions, the work should be completed not later than November 1.

As was anticipated, the removal, during grading operations, of a portion of the terminal glacial moraine just north of the outlet of the lake, disclosed a large quantity of erratic boulders. These have all been placed in a pile just west of the present ecological section, at the base of the Flatbush Avenue border mound, and will be utilized later in the construction of a rockery, which will form a division of the ecological section.

During July the bog in the wild flower section was enlarged by about one-third, and the new portion planted to insectivorous plants, to which it will be exclusively devoted. The group at present includes *Drosera rotundifolia, D. intermedia,* and *D. filiformis, Dionaea muscipula, Sarracenia purpurea, S. flava, S. Drummondii, S. rubra, S. variolus,* and species of Utricularia. The relatively large flowers of the *Dionaea* (Venus's fly-trap), and the graceful, yellow flowers of Utricularia (bladderwort), and also the profuse blossoms of the sun-dews (*Drosera*) have been objects of much interest during the past summer. The new part of the bog has been covered with a carpet of live sphagnum.

During the first week in August the labeling of the ecological section was practically completed, so far as planted.

On July 11, the Garden received from Prof. George F. Atkinson, of Cornell University, a number of plants of the water fern, *Marsilia quadrifolia,* collected by Mr. M. Ishikawa. This fern, named from Aloysius Marsili, an early Italian naturalist, is a native of Europe, and appears to have been first introduced into this country in Bantam Lake, Litchfield, Conn. This has been the center of its distribution in America. About 28 years ago, at the request of Prof. William R. Dudley, then professor of botany in Cornell University, Mr. Irving T. Hamant, a medical student in Cornell from 1884 to 1886, brought specimens of the plant from Bantam Lake. Some of these were planted by Prof. Dudley in Eddy Pond, directly beyond the "Cascadilla Woods," east of the Cornell campus. Specimens were also planted in two different places near the mouth of

Fall Creek, which empties into Cayuga Lake. In a letter of Sept. 18, 1913, Prof. G. F. Atkinson, of Cornell, to whom we are indebted for the above information, writes: "It is probably the planting at the mouth of Fall Creek which has produced the spores distributed by wind and wave action along the lake shore at that place, and also back into some of the old creek beds connected with Fall Creek; probably also at high water they have been carried over different parts of the marsh. It is reasonable to suppose, I think, that some spores have been carried down Cascadilla Creek, from Eddy Pond, and possibly some of the distribution over the marshes and along the western shore of the flats by the lake came from Eddy Pond. * * * The plants have now all been removed from Eddy Pond since grading has been done on the south side of that pond in making a small athletic field for the young women." The fern behaves as a weed, and it was with some trepidation that it was introduced into our brook above the terminal pool. It has made a rapid growth, fruiting freely in August, and constant vigilance must be exercised to keep it from becoming a nuisance. The plants have been placed in the swamp, near the west border, to form part of the hydrophytic collection of the ecological section. They are planted near the edge of a deep pool, specially prepared so as to demonstrate the adjustment of the length of the petioles to the depth of water. This length may range from a few inches to several feet, according to the depth.

Prof. Geo. F. Atkinson, of Cornell University, visited the Garden on August 11.

Dr. Homer D. House has recently been appointed Assistant to the State Botanist of New York, succeeding Mr. Stewart H. Burnham, of Glens Falls, N. Y., who resigned the position last spring.

The extensive grading operations carried on in the Garden, both last season and this, have brought into troublesome, but

interesting, prominence, a characteristic of seed germination in the Indian mallow, or velvet leaf (*Abutilon Theophrasti*). Before the soil was turned over in grading, a few stray plants of *Abutilon* had been noted here and there on the grounds, but as soon as the surface is either removed by the scraper, or turned under by the plow, innumerable seedlings appear within two or three days, and the disturbed area soon becomes covered with a thick "*Abutilon* formation." Even with the great increase in the amount of seed resulting from this, the plant has apparently not increased at all on undisturbed areas. Temporary piles of top-soil soon become thickly covered with the plant. It seems probable that seeds already present in the soil need the stimulus of either light or the oxygen of the air to initiate germination, as seedlings have never been observed on the lawn, where seedlings of such weeds as burdock, broad leaved plantain, dandelion (of course), and even of the moth mullein (*Verbascum Blattaria*) are more or less common. The behavior of the Jimson weed (*Datura Stramonium*) has been quite similar to that of *Abutilon,* seedlings appearing promptly and in relatively large numbers on newly turned soil.

On July 31 the Garden purchased the private herbarium of Mr. A. A. Heller, of the College of Agriculture of Nevada, at Reno. The herbarium comprises over ten thousand specimens, described by Mr. Heller in his letters of July 1 and 14, 1913, as follows: "The specimens are mostly western, and besides a large number of types, described by me since 1902, there are a great many, selected on account of their desirability, from exchanges; and there are a number of co-types from my earlier collections, obtained prior to 1902.* * * I made it a point to obtain dependable specimens from type localities for hundreds of California species." During September, 1913, Mr. Heller transferred his residence from Reno, Nev., to Chico, Cal.

We are pained to record the untimely death, by accidental gas poisoning, on Sunday morning, September 14, of Mr. E. L, Morris, for six years curator of natural sciences in the Brooklyn

Institute Museum, and editor of the *Bulletin of the Torrey Botanical Club*. Mr. Morris was born at Monson, Mass., on October 23, 1870. He graduated from Amherst College in 1891, taking the master's degree in 1895. From 1893-95 he was laboratory assistant and instructor in biology at Amherst, and from 1895-96, instructor in botany and chemistry in the Western High School, Washington, D. C., becoming director of botany in the Washington high schools in 1898, and head of the department of biology in 1909. He was appointed curator of natural science in the Brooklyn Institute Museum in 1897, and editor of the *Bulletin of the Torrey Botanical Club* in 1913.

During last July the layout of the general systematic section of the Garden, including trees, shrubs, and herbs was carefully mapped. On September 3, the surveyor set the stakes locating the beds, and the preparation of the beds began on September 15. The installation of this collection, covering the present lawn on either side of the brook, will be begun in October.

On the afternoon of September 17, under the auspices of the National Plant, Flower, and Fruit Guild, occurred the field day at the Children's Farm Garden, at the corner of Verona and Richards streets in the Red Hook district of Brooklyn. Prizes for the best crops were delivered to the children. Their evident delight made the occasion a very enjoyable one to all present, and their enthusiasm in the care of the beets, corn, beans, and kohl-rabi, showed clearly their innate delight in growing things. Each farm measured 4 x 10 feet. Short addresses and talks were made by Mrs. George D. Pratt, the president of the Brooklyn branch of the guild; by Mrs. Daniel C. Hood, its secretary; by Mrs. Anna T. Molten, Mr. Paul A. Steeley; and by Dr. Olive, of the Garden staff. The Visitation Church and parochial school, across the street from the farm garden, cared for the gardening tools during the season, and in other ways took vital interest in the development of this important stimulus to neighborhood and general civic betterment.

Publication of the *Leaflets*, which was discontinued for the summer with Series 1, No. 9, was resumed on September 10 with Series 1, No. 10, with four illustrations, on "Some Interesting Varieties of Corn Growing in the Garden."

During August, the swamp in the brook and the pool surrounding rock island were both considerably enlarged.

We learn from *Science* that Mr. C. Leslie Reynolds, superintendent of the National Botanical Gardens in Washington, with which he was connected for forty years, has died at the age of fifty-nine years.

During the past summer an artificial spring was constructed in the side of the border mound at the west edge of the economic section. The water from the spring flows down the steep slope of the mound into a small pool, and thence into a small swamp, thus affording a variety of desirable habitat conditions necessary for various economic plants, such as rice, water-cress, sweet-flag, and others.

The water pressure of the irrigating system of the Garden has never been sufficient for the needs of the plantations, and the need for better service will greatly increase with the installation of the general systematic plantation on the south meadow during the present fall. In anticipation of this need, a second six-inch tap was connected with the street main, near the southeast end of the Garden, just north of the line where Montgomery street meets Washington avenue. The six-inch tap leads to a meter, and the pipe from the meter is four inches. This provision will double the water pressure on the grounds.

An account in *The Bryologist* for July, 1913, of the ninth public meeting of the Sullivant Moss Society, held at the Garden on May 24, 1913, contains the following paragraph: "The Botanic Garden was a revelation to those of us who had not been over the ground since it was a part of the dumping grounds of Brooklyn. The present site of the Lake used to be a local skating pond in winter, and mosquito-breeding place in summer.

It may also be of interest to friends of our late member, Mrs. Carolyn W. Harris, to know that part of the property was owned by her husband and herself and only sold shortly prior to their death."

In the *Revue Générale de Botanique* for June 15, 1913, Mr. A. Maige gives, with several illustrations, an account of the Station for Plant Biology, recently established by the University of Poitiers at Mauroc, about four kilometers from Poitiers, from which it is easily reached by tramways. The grounds comprise about 30 hectares, of which 23 are wooded, the remainder being composed of meadows, gardens, and arable tracts. A large tract is used as an experimental garden. The main building contains, on the ground floor, apartments for the director, and his private laboratory, a lecture hall, and a microscopical and a physiological laboratory. There is an eating hall, with a large central table, and smaller tables near the windows for married men and for French and foreign professors. On the floor above are additional apartments for the director, a library, a herbarium, a room for the preparateur, and eleven well lighted private research rooms, one of which contains living accommodations for the occupant. It is not a part of the present plan to develop a botanic garden, in the ordinary sense of the term. "But," says the writer, "possibly it may be asked, who will make the investigations?" This question has often been asked concerning the Brooklyn Botanic Garden, and the answer given embodies our own. Mr. Maige replies: "We affirm with emphasis that the new station is intended not only for workers from the faculty of science of Poitiers. The University (quoting the rector Cavalier) wishes to practice the largest and most liberal hospitality. Everyone who wishes to work, from wherever he comes, will be welcome at Mauroc; he will be assured of an opportunity to pursue his investigations, of whatever nature, in complete independence and freedom."

The honorary curator of economic plants, Dr. Mansfield, has arranged a series of botanical outings, from July 27 to

November 2, for pharmacists of New York City. The excursion on July 27 was at Bear Mountain Park, and that of August 24 was at the Garden. The members of the party were especially interested in the official plants under cultivation, and the medicinal division of the economic section, the permanent installation of which has only just begun. The five remaining trips are as follows: Sept. 7, Lake Hopatcong, N. J.; Sept. 21, Eagle Rock, N. J.; Oct. 5, Woodmere, L. I.; Oct. 19, New York Botanical Garden; Nov. 2, Forest Hills, L. I.

The two largest specimens of the 17 young saplings of giant redwood (*Sequoia gigantea*), were respectively 36 and 28.5 inches high when first set out on May 9, 1911. The smaller one was planted in a very sheltered situation, surrounded by pine trees about ten feet high. The other was placed in a much less protected situation in the nursery. The less protected one appears much more vigorous than the other, and has also grown more rapidly. During the first season it increased in height only one inch and a half, but during the second season (measured August 25, 1913) there was a gain of nine inches in height, a total increase during the two years of ten and one-half inches. The smaller specimen, in the more protected situation, increased in height during the first year three and one-half inches, and during the second year (to August 25, 1913) four inches, making a total increase in height of seven and one-half inches. This marked increase in the second year, is, no doubt, due in part to more perfect acclimatization, but chiefly to the development of the root-system during the first year.

Dr. George T. Moore, director of the Missouri Botanical Garden, made a brief call at the Garden on August 26.

The former students of the late Professor Strasburger, over 60 of whom went from America to study with the famous botanist, are arranging to honor the long and faithful service of Hubert Sieben, the technician and preparator of the Botanical Institute of the University of Bonn. Mr. Sieben, who was a jolly, good friend, especially of the American students of the

"Herr Geheimrath," was for years Professor Strasburger's "right hand" in his scientific work. Next November 15th occurs the 25th anniversary of Sieben's service with the Botanical Garden and Botanical Institute of the University of Bonn; and on this occasion the present and former students at the Bonner Institute propose to present to him a cash gift, in token of their appreciation and friendship. Dr. Clemens Müller, of the Botanical Institute of the University of Bonn, is in charge of the fund.

The Garden has recently purchased from Dr. J. F. Brenkle, of Kulm, North Dakota, the nine fascicles issued so far of his *Fungi Dakotensis,* embracing 225 specimens of fungi. Most of these fungi cause disease in flowering plants, and the collection will make a valuable addition to our rapidly enlarging cryptogamic herbarium.

INDEX

Abies, 21, 51
Abutilon Theophrasti, 127
Academy of Natural Sciences, Philadelphia, 33
Academy of Sciences of Paris, 102
Accessions, New, for 1912, 57
Accounts, Botanic Garden, for 1912, 74
Accounts, Municipal, for 1912, 71
Actaea, 54
Adlerblum, Mr. Cullen, 33, 57
Agreement between the City of New York and the Brooklyn Institue of Arts and Sciences concerning the Brooklyn Botanic Garden, 75
Agreement with New York City, Amended, 25, 75
Agriculture and other Applied Sciences, Botany in Relation to, 115
Amelanchier, 17
American Association for the Planting and Preservation of City Trees, meeting of, 9
American Forestry, 69
American Museum of Natural History, 86
American Phytopathological Society, 34
American Scenic and Historic Preservation Society, 7
  Twelfth Annual Report of, 8
American Society of Landscape Architects, 32
American Universities, Doctorates conferred by, in Botany in 1913, 121
Ames, Mr. Frank H., 105
Appendices relating to Relations between New York City and the Brooklyn Botanic Garden, 75
Applied Sciences, Botany in Relation to Agriculture and other, 115
Appointments, 32, 119
  New, to the Garden Staff, 119
  Recommendations for new, 43
Appropriations for Buildings, Municipal Action on, 80
Aquarium, New York City, 86
Arboretum, Arnold, 54
Arboretum, Letchworth Park and, 7
Architect's Fees, Municipal Action concerning, 100
Arlington, N. J., Trip to Nurseries at, 58
Arnold Arboretum, 17, 33, 34, 54
  Report of a Trip to Rochester and the, 15
Association, Lincoln Place Tree, 20
Association, School Garden, of Boston, 108.
Atkinson, Prof. George F., 125, 129
Attendance, 28
Azaleas, 17

Bailey, Prof. L. H., 9
Balaban, Joseph, 106, 107
Bantam Lake, Litchfield, Conn., 125
Barnhart, Dr. John H., 43
Barron, Mr. Leonard, 108
Barta & Co., D., 111
Bear Mountain Park, 131
Beebe Lake, 125
Berberis canadensis, 16
Bids for Grading, 106
Bids for the Palm-house, 106, 107
Biology, French Station for Plant; Description of and Plans for, 130
Birches, Asiatic Species of, 16
Bisby, Mr. G., Professional Career of, 121
Bladderwort, 125
Blue Hills Reservation, 48
Board of Alderman of New York City, 111
Board of Estimate and Apportionment of New York City, 75, 83, 111
Board of Estimate of New York City, Transference by, of Additional Land to the Garden, 23, 76
Board of Park Commissioners, 111
Bog, Artificial, 54
Bonn, University of, 131
Borin, Mr. J. V., 33, 34, 51
Botanical Society of America, Garden Representation at the, 34

Botanic Garden, Brooklyn (See Brooklyn Botanic Garden)
Botanic Garden, Buffalo, N. Y., 34, 60
Botanic Gardens, National, 129
Botanic Gardens, Royal, Ceylon, 20
Botanic Garden, Smith College, 33
Botanic Garden, U. of Calif., 22
Botanical Garden, New York, 60
Botany in Relation to Agriculture and other Applied Sciences, 115
Boys' High School, Brooklyn, 10, 37
Brackett, George C., 110
Brainerd, Miss Edith B., 11
Brandt, Joseph, 8
Brenkle, Dr. J. F., 132
Bridgman, Mr. Herbert L., 9
Britton, Mrs. E. G., 105
Britton, Nathaniel L., 110
Brook, Construction of, 29
  Boulders, 94
  Cost of, 29
  Fall of, 94
  Lining of, 93
  Plans of, 93
  Pools, 94
  Provisions for Changes in, 49
  Swamp, 94, 129
  Work yet to be done on, 95
Brooklyn Botanic Garden, 6, 9, 12, 14, 15, 23, 86, 88, 90, 97, 104, 126, 127
  Agreement with City of New York respecting, 75, 110, 111
  Area of, 112
  Bog, Insectivorous Plants in, 125
  Boundary of, 98, 109
  Committee on Plan and Scope of, 110
  Committee, Meeting of, 119
  Conservatories of, 23, 124
  Cost of, Total, to City, 99
  Courses of Study, 43
  Department of Public Instruction of, 40
  Ecologic Section of, 103
  Facilities for Investigation, 114
  Foundation and Organization of the, 109
  Gifts to, 41, 44, 51, 54, 102, 110
  Grading, 29, 46, 106, 124, 127
  Herbarium of, 36, 57, 104, 108, 126
  Information concerning, in *City Record*, 75, 99
  Laboratory Building of, Contract for, 112; Delayed Work on, 23; Second Delay, 103
  Land, Value of, comprising, 98
  Leaflets, Purpose of, 95; Funds for, 97; Frequency of Issue, 95, 129
  Legislation regarding, 109, 110
  Local Flora Section, 30, 108
  Marsilia in the, 126
  Morphological Section, 30
  Municipal Action concerning Architect's Fees, 100
  Object of, 113
  Opening and Closing, Hours of, 28
  Publications of, 40, 63
  Purpose of, 119
  Record, 111
  Record of Land Purchase, 99
  Record of Law founding, 109
  Seminar, 108
  Signs, New Gate, 27
  Spring, Artificial, 129
  Supervision of Grounds, 27
  Systematic Section, 31, 128
  Tool House, New, 30
  Topographical Survey of, 111
  Transfer of Land to, 99
  Visit of Committee on, 24
  Visitors to, 41, 98, 102, 104, 107, 108
  Walks and Driveways, 30
Brooklyn Institute of Arts and Sciences, 25, 88, 100
  Biological Laboratory of 24th Session of, 101
  Board of Trustees of, 109
  Central Museum of, 60, 88, 97, 128
  Children's Museum of, 60
  Conferring of Honorary Membership in, 6
  Department of Botany of, 108
Brower, Hon. George V., 9
Brownson, Dean, 104
Brush, Hon. George W., 109
Bryologist, The, 129
Buffalo-nut, 16
Buildings, Grading and Walks, Issue of Corporate Stock for, 81
Burdock, 127
Burns, Miss, 104
Burnham, Mr. S. H., 126
Bussey Institution, 108

Calkins, Prof. Gary N., 104
Caparn, Mr. H. A., 32, 40, 48, 56
Card System, 67
Carmichael, Miss Margaret W., 10, 11, 104
Case, Mr. C. B., 37

Castle Brothers, 48
Catesby's *Hortus Britanno-Americanus*, 44
Caulophyllum, 54
Cayuga Lake, 125
Central Experimental Farm of Dominion Government, 33
Cephalotaxus, 21, 51
Ceylon, Administrative Report of the Director of The Royal Botanic Gardens, 20
Ceylon, Number of School Gardens in, 20
Chamaecyparis, 21, 51
Chamberlain, Dr. Edward B., 105
Chapin, Prof. Henry E., 7, 11, 110
Chinese Plants, Wilson Collection of, 34
Chiogenes, 54
City Record, Publications in the, concerning the Brooklyn Botanic Garden, 26, 75
City Trees, Meeting of the American Association for the Planting and Preservation of, 9
Cleveland, O., 34
Clinton, Hon. George W., 8
Cockerill & Little Co., 26, 112
Collins, Prof. J. Franklin, 105
Columbia University, 24, 66, 104
Columbia University, College of Pharmacy of, 33
Commercial High School, 103
Commissioner of Parks of Brooklyn, 44, 109
Concord Construction Co., 107
Conifers, Collection of, 51
Conifers, Hardiness Tests of, 51
Conifers, Installation of, 21
Connor, John, 106, 124
Contributions, Garden, Remarks on, 37
Coptis, 54
Cornell University, 125
Cotoneaster, 17
Crataegus, 16, 17
Cuba, 24
Cunninghammia, 21, 51
Curator of Plants, Report of, for 1912, 46
Curator of Public Instruction, Report of, 60
Curtis, Prof. C. C., 124
Cyclopedia of Horticulture, Bailey's, 58
Cypripedium, 54
Dalibarda, 54
Dandelion, 127
Datura Stramonium, 127
Dautun, Mr. Henry, Herbarium of, 104
Dawson, Mr. Jackson, 16
Dean, James, 110
De Silver, Mr. Albert, 113
Dionaea muscipula, 125
Docentry, 62
Doctorates conferred in Botany by American Universities in 1913, 121
Doctorate Theses in Botany, Titles of, conferred by American Universities in 1913, 121
Drieberg, Mr. C., 18
Drosera filiformis, 125
Drosera intermedia, 125
Drosera rotundifolia, 125
Dudley, Prof. W. R., 125
Duggar, Dr. B. M., 14
Dunbar, Mr. John, 17, 58

Eagle Rock, N. J., 131
Economic Garden, 54
Educational Activities of Brooklyn Botanic Garden, 61
Endowment Fund, 41
Epipactis, 54
Evans, Prof. Alexander W., 97, 105
Evening Post, The, 58
Evergreens, Broad-leaved, 17
Evergreens, Palmer Collection of, 43
Exchanges, Periodicals, 69
Exchanges, Plant, 32, 33
Exchanges, Rochester Park Commissioners, 17

Fahnestock, Mr. Gates D., 113
Farm Gardens, Children's Field Day, 128
Fence, Repairs of, 29, 30
Financial Statement for 1912, 41, 71
Fitzroya, 21, 51
Flatbush, 109
Force, Gardening, 51
Force, General Maintenance and Construction, 46
Forestry, Announcement of Ranger School of the New York State College of, 22
Funds, Endowment, 41
  Municipal, 41
  Private, 41
  Transfer of, Resolutions of the Board of Estimate and Apportionment concerning, 83
Fungi Dakotensis, 132

Gager, Dr. C. Stuart, 6, 9, 11, 88, 104
Addresses by, 102
Appointment of, 111
Letter of, to the Committee on Studies of the New York City Board of Education regarding Nature Study, 89
Publications of, 38
Public Lectures and Addresses of, 38
Garden Magazine, The, 58, 108
Gaultheria, 54
Grading, Bids for, 106
Grading, General, 29, 46, 126
Grout, Dr. Abel J., 97, 110
Guild, National Plant, Flower and Fruit, 128

Hall, Dr. Edward H., 9
Hall, Prof. H. M., 22
Hamant, Mr. Irving T., 125
Hammonton, N. J., 58
Harden Brothers, 48
Harshberger, Prof. John W., 124
Haynes, Miss Caroline C., 105
Harris, Mrs. Carolyn W., 130
Healy, Mr. A. Augustus, 113
Heller, Mr. A. A., 127
Herbaceous Plants, 56
Herbarium, Purpose of the, 36
Additions to, 36, 57, 104, 127
Hickey, M. F., 106
Hicks, Mr. Henry, 44
Hicks, Isaac & Son, 54
Higgins, Governor, 111
High School, Boys', 10
High School, Commercial, 103
High School, Peabody, 14
High Schools, Brooklyn, 41
High School Teachers, Conferences with, 11, 60
Hood, Mrs. Daniel C., 128
Hooper, Prof. Franklin W., 6, 88, 110, 113
Hours of Opening and Closing, 28
House, Dr. Homer D., 126
Howe, Dr. Marshall A., 105
Humphrey, Mr. W. J., 9
Hutchinson, Miss Susan, 43, 98
Hydrangea, 16
Hydrangea anomala, 16
Hydrangea arborescens, 16

Indian Mallow, 127
Insectivorous Plants, 125
Investigations, 37
Ishikawa, Mr. M., 125

Jacket, John, 8
Jamaica Training School, 104
Jamison, Thomas, 8
Japanese Garden, 105
Japan Society, 105
Jennings, Mr. Otto E., 14
Jimson weed, 127
Johnson, Sir William, 8
Juniperus, 21, 51

Kelly & Kelley, Inc., 107
Kelly, Margaret, 99
Kennedy, Hon. Michael J., 112
Kittredge, Miss E. M., 44, 51
Kolsh, Mr. Herman, 46
Kulm, No. Dak., 132
Kunkel, Mr. Otto, 124

Labelling and other Clerical Work, 57
Labels, Show, 57
Laboratory Building, Lowest Bids for, 26
Laboulbeniaceae, 23
Lacquer Tree, Japanese, 15
Laney, Mr. C. C., 17, 58
Lantern Slides, 64
Leipziger, Dr. Henry M., 9
Lemborg, Mr., 33
Letchworth, Mr. Wm. Pryor, 7
Letchworth Park and Arboretum, 7
Levison, Mr. J. J., 9, 10, 23, 44, 104
Libocedrus, 21, 51
Librarian, Report of the Secretary and, for 1912, 67
Library, The, 67
Facilities, Recommendations for, 34
Growth of, 68, 70
Number of Volumes in, 70
Periodicals and Books in, 36
Shelving Facilities, 68
Lincoln Place Tree Association, 21
Object of, 21
Lines, Dr. Mary L., 105
Liquidambar styraciflua, 1, 40, 44
Local Flora, Studies of, 37
Lorenz, Miss Annie, 98
Lucas, Frederic A., 110
Luquer, Mr. Thatcher T. P., 46
Luther, Miss Agnes V., 108

Maige, Mr. A., 130
Mansfield, Dr. William, 32, 129
Maples, Norway, 21
Marsili, Aloysius, 125
Marsilia quadrifolia, Introduction of, from Europe, 125

Massachusetts Institute of Technology, 104
Mauroc, 130
Maxwell, William H., 110
McCallum, Mr. John, 23, 51
McCallum, Mr. John, Sr., 44
McClellan, Mayor, 111
McGill University, 33
McKim, Mead & White, Messrs., Official Designation of, 112
Miranda, Mr. Antonio, 98
Missouri Botanical Garden, 12, 13
  Annual Report, 102, 103
  Bulletin, 102
  Educational value of, 13
  Endowment of, 12
  Herbarium of, 13
  Library, 13, 103
  New Buildings, 103
  No. of Living Plants in, 103
  Pupils at, 13
  Research Fellowships at, 13
  Research Work, Equipment for, 13
  Scientific Staff, 14
Missouri, University of, 33
Mitella, 54
Molten, Mrs. Anna T., 128
Montauk, L. I., 108
Moore, Dr. George T., 12, 14, 128
Morris, Mr. E. L., 43, 66, 88, 98, 127
Morris Park, L. I., 23
Moss-pink, 105
Moth Mullein, 127
Mott, J. L., Iron Works, 23, 29
Mt. Olivet Presbyterian Church, Men's Club of, 104
Müller, Dr. Clemens, 129
Municipal Account for 1912, 71
Municipal Funds, Economies in Expenditure of, 14
Museum, Carnegie, 14
Museum, Children's, 10
Museum of Natural History, American, 86

Nash, Mr. George V., 8, 43
National Botanic Gardens, 129
Nation, The, 58
Nature Study in the Public Schools of Greater New York, 85
  Letter of Dr. C. Stuart Gager on, 89
  New York City Board of Education's Public Hearing on, 88
  Recommendations of New York City Board of Education concerning, 85
  Suggestions of Dr. Gager regarding its Place in the Public Schools, 89
Newcombe, Professor F. C., 107
New Jersey, Pine Barren Region of, 37, 105
New York Academy of Sciences, 24
New York Botanical Garden, 8, 43, 66, 131
New York City and Vicinity, 1913 Summer Courses in Botany in, 124
New York City, Agreement with, respecting Brooklyn Botanic Garden, 36, 43, 45, 110
  Amended Agreement with, 25
  Annual Report of the President of the Board of Education, 85
  Aquarium of, 86
  Board of Education, 85
  College of, 33
  Zoological Park, 86
New York, College of the City of, 104
New York, Greater. Nature Study in the Public Schools of, 85
New York State, 7
New York State College of Forestry,
  Announcement of, 22
  State Fair Exhibit of, 22
New York Sunday World, 108
New York University, 58, 104, 124
Normal School, Newark, N. J., 108
Norton & Gorman Contg. Co., 106
Notes, 21, 101, 124

Oaks, Chinese, 16
Office Work, 70
Olive, Dr. E. W., 11, 33, 36, 40
  Address by, 103, 104, 128
  Articles by, 40
  Judge at school Exhibition, 108, 128
  Recommendations by, 65
  Research Work of, 65
  Trips of, 65
Olmstead Bros., Messrs., 32, 111
Olmstead, Mr. F. L., 48
Organization of Children for the Planting of Trees, 10
Osborn, Mrs. Kate, 8
Ottawa, Canada, 33

Paliurus orientalis, 15
Palmer, Lowell, M., 110

Palm House, Bids for, 26, 103
Pamphlet-binder, Gaylord, 68
Paris, Academy of Sciences of, 102
Park Commissioners of Rochester, N. Y., Board of, 56
Parsons, Mr. Samuel, 112
Peabody High School, 14
Peters, Mrs. Clayton A., 44
Pharmacists, Botanical Outings for, 130
Phelps, Mrs. C. S., 51
Phelps, Professor Earl B., 104
Philadelphia, Academy of Natural Sciences of, 33
Phipps Conservatories, 14
Phipps Hall of Botany, 14, 33
Phlox subulata, 105
Picea, 21, 51
Pieris, 17
Pierson U-Bar Company, 103
Pinetum, 32
Pinus, 21, 51
Pixidanthera barbulata, 44
Plantain, Broad-leaved, 127
Planting and Preservation of City Trees, Meeting of the American Association for the, 9
Planting of Trees, Organization of Children for the, 10
Plant Biology, Station for, 130
Plants, Chinese, 54
Poitiers, University of, 130
Pollock, James, 44
Portage Falls, 7
Pratt, Mr. Arthur, 21
Pratt, Mr. George D., 113
Pratt, Mrs. George D., 128
Price, Mr. Overton W., 8
Prospect Park, 109
Publications, Gifts of, 69
Publications, Care of Unbound, 68
Publications, Complete Set of Serial, 68
Publications, Exchange, 69
Public Schools, Nature Study in the, of Greater New York, 85
Puccinia, 37
Puget, Miss Mary A. du, 44
Purdon, Mr. W., 54
Putman, Mr. William A., 113
Pyrola, 54
Pyrularia,
  Parasitic nature of, 16
  Propagation of, 16

Ranger School, New York State College of Forestry, Announcement of, 22
Redwood, Giant, 105
Redwood, Giant, in the Garden, 131
Reighard, Prof. Jacob, 107
Repairs, Fence, 29, 30
Report of a trip to Rochester and the Arnold Arboretum, 15
Report of the Brooklyn Botanic Garden, 1912, Second Annual, 25
Report of the Director for 1912, 25
  Accompanying Papers, 44
  Acknowledgments, 43
  Addresses, Public Lectures and, 38
  Agreement, Amended, with New York City, 25
  Appointments, 32
  Appropriations, Plans and Specifications, 26
  Attendance, 28
  Building Operations, 26
  Courses of Study, 43
  Department of Public Instruction, 40
  Expenditures, How Assigned, 42
  Field Meetings, 38
  Grounds, Supervision and Patrol of, 27
  Headquarters, Temporary, 25
  Herbarium, Additions to, 36
  Hours of Opening and Closing, 28
  Increase of Staff, 42
  Investigations, 36
  Iron Fence, Removal of and Resetting of, 29
  Painting and Repair Work on, 30
  Library, 34
  Municipal Fund, 41
  Plantations, Progress in Development of, 30
  Private Funds, 41
  Publications of Brooklyn Botanic Garden, 40
  Research Fellowships, 37
  Research, Students, 37
  Signs, Gate, 27
  Soil, Improvement, Grading and Brook Construction, 29
  Tree Planting by Prof. de Vries, 40
  Trips, 33
Report of the Curator of Plants for 1912
  Addresses and Lectures, 58
  Arnold Arboretum, 54
  Assistance, 46

Bog, Artificial, 54
Collections, Tentative, 56
Economic Garden, 54
Force, General Maintenance and Construction, 46
Gardening Force, 51
Grading Methods, 48
Labelling and other Clerical Work, 57
Nursery, 54
Personal Activities, 58
Plans for Collections, 56
Recommendations, 58
Soil Improvement Scheme Completed, Cost of, etc., 49, 50
Systematic Collections, General, Tentative Plans for, 56
Trips, 58
Report of the Curator of Public Instruction for 1912, 60
Activities, Tentative Outline of Educational, of the Brooklyn Botanic Garden, 61
Guide Service, 64
Lantern Slides, 64
Recommendations, 65
Research, 65
School Gardens, 65
Seminar, Garden, 64
Report of the Secretary and Librarian for 1912, 67
Additions to Periodicals received, 69
Assistance, 67
Binding, 68
Card Systems, 67
Care of Unbound Publications, 68
Exchanges, 69
Gifts, 69
Library, Growth of, 68
Library, The, 67
Office Work, 70
Periodicals received, 69
Publications, Detailed Summary of, now in possession of Garden, 69
Publications, Method of Recording, 67
Sets completed, 68
Shelving Facilities, 68
Revue Générale de Botanique, 130
Reynolds, Mr. C. L., 129
Rhus vernicifera, 15
Rice, Studies of Life History and Breeding of, 37
Rochester, N. Y., Park Department of, 34
Rochester, Report of a Trip to, and the Arnold Arboretum, 15
Roessle, Mr. Albert, 21
Rorer, Mr. J. B., 23
Royal Academy of Sciences of Prussia, 102
Rusts, Plant, Studies on, 37
Rynearson, Prof. Edgar, 14

Salisbury, Conn., 51
Salix, 16
Sanguinaria, 54
Sargent, Prof. C. S., 15, 16
Sarracenia Drummondii, 125
flava, 125
purpurea, 125
rubra, 125
variolus, 125
Schieren, Charles A., 110
Schofield, Mr. P. F., 44, 69
School Garden Association of Boston, 108
School Gardens, Judging, 18
School Gardens, Objects of, in Ceylon, 18, 19
School Gardens, Recommendations for, 42
School, Public, No. 42, Brooklyn, Girls' High School annex of, 108
Schoonhoven, Mrs. John J., 104
Schramm, Mr., 12
Schrenk, Dr. Herman von, 14
Screw-Pines, 56
Secretary and Librarian for 1912, Report of the, 67
Seminar, Botanical, 41
Sequoia gigantea, 105, 131
Service Yard, Temporary, 57
Setchell, Prof. William A., 22
Sharp, Mr. Richard W., 11
Shaw, Miss Ellen Eddy, 105, 119
Educational and Professional Record of, 120
Shaw School of Botany, Henry, 12
Sheehan & Co., John R., 107
Sieben, Hubert, Appreciation for Services, 128
Smith College, Botanic Garden of, 33
Smith, Mrs. Annie Morrill, 98, 105
Snow, Prof. C. H., 58
Soil Improvement Scheme, Cost of for 1912, 49
Staff, 42; New Appointments to, 119
Standard Union, The, 9
Staten Island, 51
Stelle, Miss Helen Virginia, 119; Professional Career of, 120

Steeley, Mr. Paul A., 128
St. Fargeau, Yonne, France, 104
Sterling, Lucy A. B., 99
Stetson, Mr. Sereno, 105
Strasburger, Prof. E., 131
Sullivant Moss Society, 126
    Ninth public Meeting of, 97
Summer Courses in Botany in New York City and Vicinity, 1913, 124
Sumstine, Dr. David R., 14
Sun-dews, 125
Supply Department, 63
Sweet Gum, 1, 2
Systematic Collections, General, Tentative Plans for, 56

Taylor, N., 6
    Articles by, 39
    Addresses by, 38
    Field Trips of, 108
Tax Budget for 1913, Municipal Action on, 81
Teachers, Conference with High School, 11
Teacher's Leaflets, 18
Teachers, New York Association of Biology, 11
Thaxter, Prof. Roland, 23
Thom, Dr. Charles, 107
Thompson, William J., 27
Tiarella, 54
Toad-flax, Peloric, 22
Torreya, 21, 51, 58
Torrey Botanical Club, 104
    Bulletin of the, 128
Torrey, Mr. Herbert Gray, 44
Torrey, Dr. John, Bronze Bas Relief of, 44
Torrey, Miss Margaret, 44
Trailing Arbutus, 54
Tree Planting, 102
Tree-planting by Prof. De Vries, 1
Trees, Hardiness of Coniferous, 21
Trees, Planting of, along Brook, 95
Trillium, 54
Trip, Report of a, to Rochester and to the Arnold Arboretum, 15
Trip, Report of a, to Botanical Institutions, 12
Trips, Chester and Lancaster Counties, Penn., 105
Trips of Garden Staff, 12, 33, 57, 105

University of Bonn, Botanical Institute of, 131
University of Poitiers, 127
Utricularia sp., 125

Vail, Prof. Charles Delamater, 9
Van Hise, President, 115
Van Sickle, William M., Herbarium of, 106
Venus's Fly-trap, 125
Verbascum Blattaria, 127
Viola, Hybrids and Varieties of, 44
Vries, Prof. Hugo de, 1, 6, 22, 24, 40, 102
    Conferring of honorary membership in the Brooklyn Institute of Arts and Sciences, 6
    Tree Planting by, 40

Washington Avenue, 109
Washington University, 12
Water Facilities, Need of better, 129
Water Fern, 125
Water-lilies, Collection of, 56
Water-lilies, Hardy, 32
Wiesner, Herr Hofrat Professor Dr. Julius von, 102
Whetzel, Prof. H. H., 102
White, Mr. Alfred T., 34, 44, 69, 110, 113
White, Mr. W. A., 44
White, Dr. O. E., 108, 119
    Academic and Professional Career of, 119
Willows, Collection of, 17, 56
Wilson Collection of Chinese Plants, 34
Wilson, Mr. E. H., 15, 54
Wilson, Mr. Guy West, 102
Wisconsin, University of, 115
Wood, Mr. George C., 10, 21, 37
Woody Plants, Collection of, Additions to, 54

Yale School of Forestry, Visit of Senior Class of the, 23
Yale University, 105
York, Prof. Harlan H., 124

The Brooklyn Institute of Arts and Sciences

Officers of the Board of Trustees

President—A. AUGUSTUS HEALY
First Vice-President—HON. CHARLES A. SCHIEREN
Second Vice-President—COL. ROBERT B. WOODWARD
Third Vice-President—GEORGE D. PRATT
Treasurer—DANIEL V. B. HEGEMAN
Secretary—HERMAN STUTZER

Executive Committee

A. AUGUSTUS HEALY

E. Le GRAND BEERS
DR. GEORGE W. BRUSH
HON. WILLIAM J. COOMBS
GEORGE D. PRATT
WALTER H. CRITTENDEN
GATES D. FAHNESTOCK
DANIEL V. B. HEGEMAN
DICK S. RAMSAY
HERMAN STUTZER
ALFRED T. WHITE
COL. ROBERT B. WOODWARD

Committee on Botanic Garden

ALFRED T. WHITE

GATES D. FAHNESTOCK
ALBERT DeSILVER
GEORGE D. PRATT
WILLIAM A. PUTNAM

Ex Officio Members of the Board

THE MAYOR OF THE CITY OF NEW YORK
THE PRESIDENT OF THE BOROUGH OF BROOKLYN
THE COMMISSIONER OF PARKS, BOROUGH OF BROOKLYN

PROF. FRANKLIN W. HOOPER, *Director*

PUBLICATIONS
OF THE
BROOKLYN BOTANIC GARDEN

RECORD. Established January, 1912. An administrative periodical, issued quarterly. Contains, among other things, the annual report of the Director and heads of departments, special reports, announcements of courses of instruction, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Department of Botany of the Institute. To others one dollar a year; 25 cents a copy.

CONTRIBUTIONS. Papers originally published in botanical or other periodicals, reissued as "separates," without change of paging, and numbered consecutively. This series includes occasional papers, as well as those embodying the results of research done at the Garden, or by members of its staff or students. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume.

1. *The Educational Work of Botanic Gardens.* 13 pages. 1911.
2. *The Purpose of an Introductory Course in Botany.* 8 pages. 1911.
3. *Cryptomeric Inheritance in Onagra.* 11 pages, figs. 2; plates 2. 1911.
4. *On the Origin and Present Distribution of the Pine-Barrens of New Jersey.* 15 pages, figs. 2. 1912.
5. *Ingrowing Sprouts of Solanum tuberosum.* 10 pages, figs. 6; plate 1. 1912.
6. *Intermingling of perennial sporophytic and gametophytic generations in Puccinia Podophylli, P. obtegens and Uromyces Glycyrrhizae.* 15 pages, 1 plate. 1913.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication.

1. *The Brooklyn Botanic Garden.* Price, 5 cents.

LEAFLETS. Established April 10, 1913, and published weekly or bi-weekly during April, May, June, September, and October. The purpose of the Leaflets is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to all who wish them.